

# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## LESSON PLAN

Session (2022-2023)

|   |  |  |
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| <b>Discipline:</b><br>Mechanical Engineering                              | <b>Semester:</b><br>6 <sup>th</sup> , Summer /2023 | <b>Name of the Teaching Faculty:</b><br>DEBASISH PANDA |
| <b>Subject:</b><br>Industrial Engineering<br>and Management,<br>Theory-01 | <b>No. of Days/Week:</b> 04                        | Class Test: 20<br>End Semester Examination: 80         |

| Week | Class Day | Theory Topics  |
|------|-----------|--|
| 1st  | 1st       | <b>PLANT ENGINEERING:</b><br>Plant and plant location<br>Selection of Site of Industry.<br>Factors governing plant location. |
|      | 2nd       | Plant layout and their types,<br>The objective and principles of plant layout.   |
|      | 3rd       | Process Layout with relative advantages and disadvantages.   |
|      | 4th       | Product Layout with relative advantages and disadvantages.   |
| 2nd  | 1st       | Combination Layout.<br>Techniques to improve layout.   |
|      | 2nd       | Principles of material handling equipment  |
|      | 3rd       | Plant maintenance and its Importance   |
|      | 4th       | i) Break down maintenance.<br>ii) Scheduled maintenance.   |
| 3rd  | 1st       | iii) Preventive maintenance.<br>iv) Predictive Maintenance   |
|      | 2nd       | <i>Doubt Clearing Class</i>  |
|      | 3rd       | <i>Assignment Evaluation</i>   |
|      | 4th       | <b>INVENTORY CONTROL:</b><br>Inventory Control and their types,<br>Objective and functions of inventory control.             |
| 4th  | 1st       | Benefits of inventory control.<br>Costs associated with inventory.   |

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|      | 2nd | Terminology in inventory control, Concept of Economic order quantity (EOQ Model)   |
|      | 3rd | ABC analysis   |
|      | 4th | Solve numerical on EOQ   |
| 5th  | 1st | Concept of ABC analysis.   |
|      | 2nd | <i>Doubt Clearing class</i>  |
|      | 3rd | <i>Assignment Evaluation / Class Test</i>  |
|      | 4th | <b>OPERATIONS RESEARCH:</b><br>Operations Research, methods of operation research and its applications.  |
| 6th  | 1st | Linear Programming Problem with its application  |
|      | 2nd | Solving L.P.P. by graphical method.  |
|      | 3rd | Solving L.P.P. by graphical method.  |
|      | 4th | Solving L.P.P. by graphical method.  |
| 7th  | 1st | <b>NETWORK ANALYSIS:</b><br>Network analysis and its related terms such as event, activity, critical activity, non-critical activity, dummy activity and critical path |
|      | 2nd | EST, EFT, LST, LFT, float, total project duration  |
|      | 3rd | Evaluation of Project completion time by Critical Path Method (Simple problems)  |
|      | 4th | Evaluation of Project completion time by PERT (Simple problems)  |
| 8th  | 1st | Distinguish between PERT with respect to CPM.  |
|      | 2nd | Solve related problems   |
|      | 3rd | Solve related problems   |
|      | 4th | <i>Doubt Clearing Class</i>  |
| 9th  | 1st | <i>Assignment Evaluation / Quiz Test</i>   |
|      | 2nd | <b>PRODUCTION PLANNING AND CONTROL</b><br>Production planning and control<br>Major functions of production planning and control  |
|      | 3rd | Principles of product and process planning   |
|      | 4th | Methods of forecasting   |
| 10th | 1st | Concept of Routing, Scheduling   |
|      | 2nd | Dispatching and controlling  |
|      | 3rd | Types of production like<br>Mass, Batch and Job order production   |
|      | 4th | <i>Doubt Clearing Class</i>  |
| 11th | 1st | <i>Class Test</i>  |
|      | 2nd | <b>INSPECTION AND QUALITY CONTROL:</b><br>Inspection and Quality control.  |

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|------|-----|---|
|      |     | Planning of inspection.   |
|      | 3rd | Types of inspection.  |
|      | 4th | Quality Control and discuss the factors influencing the quality of manufacture. |
| 12th | 1st | Advantages and disadvantages of quality control.                                |
|      | 2nd | Concept of statistical quality control, Control charts                          |
|      | 3rd | Methods of attributes   |
|      | 4th | Control charts (X and R charts).  |
| 13th | 1st | Control charts (C and P charts).  |
|      | 2nd | Solving Related Problems  |
|      | 3rd | Solving Related Problems  |
|      | 4th | Quality management system, Registration /certification procedure.               |
| 14th | 1st | Concept of ISO 9001-2008<br>Benefits of ISO to the organization.                |
|      | 2nd | Concept of JIT  |
|      | 3rd | Concept of Six sigma, 7S and Lean manufacturing                                 |
|      | 4th | <i>Assignment Evaluation / Quiz Test</i>  |
| 15th | 1st | <i>Practice Test</i>  |
|      | 2nd | <i>Revision</i>   |
|      | 3rd | <i>Revision</i>   |
|      | 4th | <i>Discussion of previous year question paper</i>                               |

# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## LESSON PLAN

### Session (2022-2023)

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| <b>Discipline:</b> Mechanical Engg.                | <b>Semester:</b> 5 <sup>th</sup> , Winter/2022 | <b>Name of the Faculty:</b><br>DEBASISH PANDA<br>Lecturer |
| <b>Subject:</b> Refrigeration and Air Conditioning | <b>No of Days/week:</b> 04                     | Class Test: 20<br>End Semester Examination:80             |

| Week | Class Day       | Theory Topics   |
|------|-----------------|---|
| 1st  | 1 <sup>st</sup> | Concept of refrigeration and unit of refrigeration.   |
|      | 2 <sup>nd</sup> | Definition of COP, Refrigerating effect (R.E )  |
|      | 3 <sup>rd</sup> | Principle of working of open and closed air system of refrigeration.  |
|      | 4th             | Calculation of COP of Bell-Coleman cycle and Problem Solving.   |
| 2nd  | 1 <sup>st</sup> | Schematic diagram of simple vapors compression refrigeration system   |
|      | 2 <sup>nd</sup> | Cycle with dry saturated vapors after compression   |
|      | 3 <sup>rd</sup> | Cycle with wet vapors after compression.  |
|      | 4th             | Cycle with superheated vapors after compression.  |
| 3rd  | 1 <sup>st</sup> | Cycle with superheated vapors before compression  |
|      | 2 <sup>nd</sup> | Cycle with sub cooling of refrigerant   |
|      | 3 <sup>rd</sup> | Representation of above cycle on temperature entropy and pressure enthalpy diagram. Problem solving (determination of COP, mass flow) |
|      | 4th             | Practice Test/Assignment  |

| <b>Week</b> | <b>Class Day</b> | <b>Theory Topics</b>  |
|-------------|------------------|---|
| 4th         | 1 <sup>st</sup>  | Working principle of Simple vapor absorption refrigeration system   |
|             | 2 <sup>nd</sup>  | Working principle of Practical vapor absorption refrigeration system  |
|             | 3 <sup>rd</sup>  | COP of an ideal vapor absorption refrigeration system<br>Problem solving on COP   |
|             | 4th              | Refrigerant compressors, Working Principle of working and constructional details of reciprocating and rotary compressors. |
| 5th         | 1 <sup>st</sup>  | Centrifugal compressor, Hermetically and semi hermetically sealed compressor.   |
|             | 2 <sup>nd</sup>  | Principle of working and constructional details of air cooled and water cooled condenser.                                 |
|             | 3 <sup>rd</sup>  | Heat rejection ratio. Cooling tower and spray pond  |
|             | 4th              | Class Test/Assignment   |
| 6th         | 1 <sup>st</sup>  | Recap/Summerize   |
|             | 2 <sup>nd</sup>  | Principle of working and constructional details of an evaporator.   |
|             | 3 <sup>rd</sup>  | Types of evaporator.<br>Bare tube coil evaporator.  |
|             | 4th              | Finned evaporator, shell and tube evaporator.   |
| 7th         | 1 <sup>st</sup>  | Function of expansion valves<br>Working of Capillary tube   |
|             | 2 <sup>nd</sup>  | Working principle of Automatic expansion valve  |
|             | 3 <sup>rd</sup>  | Working principle of Thermostatic expansion valve   |
|             | 4th              | Recap/Summerize   |
| 8th         | 1 <sup>st</sup>  | Classification of refrigerants  |
|             | 2 <sup>nd</sup>  | Desirable properties of an ideal refrigerant.   |
|             | 3 <sup>rd</sup>  | Designation of refrigerant.   |
|             | 4th              | Thermodynamic Properties of Refrigerants.   |
| 9th         | 1 <sup>st</sup>  | Chemical properties of refrigerants.  |
|             | 2 <sup>nd</sup>  | Commonly used refrigerants, R-11, R-12, R-22, R-134a, R-717   |
|             | 3 <sup>rd</sup>  | Applications of refrigeration   |
|             | 4th              | Class Test/Assignment   |

| <b>Week</b> | <b>Class Day</b> | <b>Theory Topics</b>   |
|-------------|------------------|--|
| 10th        | 1 <sup>st</sup>  | Recap/Summerize  |
|             | 2 <sup>nd</sup>  | Working details of cold storage  |
|             | 3 <sup>rd</sup>  | Substitute for CFC   |
|             | 4 <sup>th</sup>  | Ice plant and dairy refrigeration  |
| 11th        | 1 <sup>st</sup>  | Working principle of water cooler  |
|             | 2 <sup>nd</sup>  | Recap/Summerize  |
|             | 3 <sup>rd</sup>  | Discussion about frost free refrigerator.  |
|             | 4 <sup>th</sup>  | Psychometric terms   |
| 12th        | 1 <sup>st</sup>  | Adiabatic saturation of air by evaporation of water.                                   |
|             | 2 <sup>nd</sup>  | Class Test/Assignment  |
|             | 3 <sup>rd</sup>  | Recap/Summerize  |
|             | 4 <sup>th</sup>  | Psychometric chart and uses.   |
| 13th        | 1 <sup>st</sup>  | Psychometric processes   |
|             | 2 <sup>nd</sup>  | Sensible heating and Cooling   |
|             | 3 <sup>rd</sup>  | Cooling and Dehumidification   |
|             | 4 <sup>th</sup>  | Heating and Humidification   |
| 14th        | 1 <sup>st</sup>  | Adiabatic cooling with humidification, Total heating of a cooling process<br>SHF, BPF, |
|             | 2 <sup>nd</sup>  | Adiabatic mixing, Problem solving.   |
|             | 3 <sup>rd</sup>  | Effective temperature and Comfort chart.   |
|             | 5 <sup>th</sup>  | Factors affecting comfort air conditioning. Equipment used in an air-conditioning.     |
|             | 1 <sup>st</sup>  | Classification of air-conditioning system, Winter Air Conditioning System              |
|             | 2 <sup>nd</sup>  | Summer air-conditioning system. Numerical on above                                     |

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| 15th | 3 <sup>rd</sup> | Revision and Question discussion  |
|      | 4th             | Revision and Question discussion. |

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## LESSON PLAN

Session (2022-2023)

|  |   |  |
|--|---|--|
| <b>Discipline:</b><br>Mechanical<br>Engineering        | <b>Semester:</b><br>4 <sup>TH</sup> , Summer/2023 | <b>Name of the Teaching Faculty:</b><br>DEBASISH PANDA |
| <b>Subject:</b><br>Thermal Engineering-II,<br>Theory-4 | Theory Periods/W<br>04                            | Class Test: 20<br>End Semester Examination:80          |

| Week | Class Day | Theory Topics   |
|------|-----------|---|
| 1st  | 1st       | Revision the basic of I.C Engine and it's working.  |
|      | 2nd       | Explain Indicated power, Brake Power and frictional power of an I.C engine.                     |
|      | 3rd       | Define Mechanical, Indicated thermal and Relative efficiencies of an I.C engine.                |
|      | 4th       | Define Break thermal efficiency, Volumetric efficiency and Overall efficiency of I.C engine.    |
| 2nd  | 1st       | Define Mean effective pressure, Specific fuel consumption and Air-fuel ratio for an I.C engine. |
|      | 2nd       | Classroom Problem   |
|      | 3rd       | Classroom Problem   |
|      | 4th       | <i>Assignment Evaluation/Class test</i>   |
| 3rd  | 1st       | Define Compressor; explain its function, types and industrial use of compressed air.            |
|      | 2nd       | Classify Compressor and principle of operation.   |
|      | 3rd       | Explain the Terminology of Reciprocating air compressor.  |
|      | 4th       | Describe the parts and working principle of a reciprocating air compressor.                     |
| 4th  | 1st       | Derive the expression of indicated work for a single acting compressor without clearance.       |
|      | 2nd       | Define mean effective pressure, power and Mechanical efficiency.                                |
|      | 3rd       | Derive the expression of indicated work for a single acting compressor with clearance.          |



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|      | 4th | Explain actual Indicator diagram for a compressor.   |
| 5th  | 1st | Explain the limitation of Single stage compressor and also explain the multi stage compressor and its advantage. |
|      | 2nd | Classroom Problem  |
|      | 3rd | Classroom Problem  |
|      | 4th | <i>Assignment Evaluation/Class test</i>  |
| 6th  | 1st | Explain the formation of steam and differentiate between gas and vapours.  |
|      | 2nd | Define pure substance and its phases and explain the phase change phenomena of a pure substance.                 |
|      | 3rd | State and Explain the Terminology of a pure substance.   |
|      | 4th | Explain the property diagram i.e. P-V, T-V and P-V-T diagram   |
| 7th  | 1st | Explain Critical point, Triple point and T-S and h-S diagram.  |
|      | 2nd | Explain the Steam table and Mollier chart for finding the unknown properties.                                    |
|      | 3rd | Explain the Enthalpy change during the formation of steam.   |
|      | 4th | Explain the latent heat, Sensible heat, latent heat of fusion and Enthalpy of Vaporization.                      |
| 8th  | 1st | Explain the wet steam, dry steam and superheated steam and advantage of superheating the steam.                  |
|      | 2nd | Classroom Problem  |
|      | 3rd | Classroom Problem  |
|      | 4th | <i>Assignment Evaluation &amp; Class Test</i>  |
| 9th  | 1st | Define Boiler and classification of boiler.  |
|      | 2nd | Explain principal part and their function of a boiler.   |
|      | 3rd | Define characteristic of a good boiler and factor affecting the selection of boiler.                             |
|      | 4th | Explain the comparison between fire and water tube boiler.   |
| 10th | 1st | Description and working of Cochran boiler.   |
|      | 2nd | Description and working of Lancashire boiler.  |
|      | 3rd | Description and working of Babcock and Wilcox boiler.  |
|      | 4th | Explain the classification and function of a boiler draught'   |
| 11th | 1st | Describe the function of Forced, Induced draught and Balanced draught.   |
|      | 2nd | Explain about Boiler Mountings and Accessories.  |
|      | 3rd | Review class   |
|      | 4th | Classroom Problem  |

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| 12 <sup>th</sup> | 1st | Define Vapor power cycle and explain performance parameters of vapor power cycle. |
|                  | 2nd | Explain Carnot vapor power cycle, Derive the work and efficiency of the cycle.    |
|                  | 3rd | Explain principal component and their function of vapour power plant.             |
|                  | 4th | Define Rankine cycle with P-V, T-S, and h-s diagram                               |
| 13th             | 1st | Derive the work done and efficiency of Rankine cycle                              |
|                  | 2nd | Describe the effect of various end condition in Rankine cycle                     |
|                  | 3rd | Explain Reheat cycle and Regenerative cycle.                                      |
|                  | 4th | Classroom Problem   |
| 14th             | 1st | Define the modes of heat transfer i.e. Conduction, convection and Radiation.      |
|                  | 2nd | Explain Fourier's law of heat conduction and thermal conductivity.                |
|                  | 3rd | Explain Newton's law of cooling Stefan Boltzmann's law and Kirchhoff's law.       |
|                  | 4th | Explain black body radiation and emissive power of a black body and grey body.    |
| 15th             | 1st | Define Emissivity, Absorptivity and Reflectivity.                                 |
|                  | 2nd | <i>Assignment Evaluation &amp; Class Test</i>                                     |
|                  | 3rd | <i>Discussion on Previous year question paper</i>                                 |
|                  | 4th | <i>Discussion on Previous year question paper</i>                                 |

# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## LESSON PLAN

Session (2022-2023)

|   |   |  |
|---|---|--|
| <b>Discipline:</b><br>Mechanical<br>Engineering       | <b>Semester:</b><br>3 <sup>rd</sup> , Winter/2022 | <b>Name of the Teaching Faculty:</b><br>DEBASISH PANDA |
| <b>Subject:</b><br>Thermal Engineering-I,<br>Theory-4 | <b>No. of<br/>Days/Week:</b> 04                   | Class Test: 20<br>End Semester Examination: 80         |

| Week | Class Day | Theory Topics   |
|------|-----------|---|
| 1st  | 1st       | Define Thermodynamics. Define System, surroundings and boundary. Explain open closed and isolated system.       |
|      | 2nd       | Define Intensive and extensive properties. Differentiate between homogeneous and heterogeneous system.          |
|      | 3rd       | Define Microscopic and macroscopic approach of thermodynamics. Explain Continuum Approach, Quasi-static process |
|      | 4th       | Thermodynamic properties of a system (Pressure, volume, temperature and units of measurement).                  |
| 2nd  | 1st       | Define thermodynamic State, path, process and cycle.  |
|      | 2nd       | Explain Thermodynamic equilibrium i.e. thermal mechanical and chemical equilibrium.                             |
|      | 3rd       | Conceptual explanation of energy and its sources.   |
|      | 4th       | Explain work and heat, their relation, units and Work transfer,   |
| 3rd  | 1st       | Derive the formula for the work done in a closed system.  |
|      | 2nd       | Explain Mechanical equivalence of heat and differentiate between heat and work.                                 |
|      | 3rd       | <i>Assignment evaluation /class test</i>  |
|      | 4th       | Numerical   |
| 4th  | 1st       | State and explain Zeroth law and First law of thermodynamics. Limitation of First law.                          |
|      | 2nd       | Application of first law for flow process. Derivation of steady flow energy equation.                           |
|      | 3rd       | Application of SFEE in Nozzle Turbine and Compressor.   |
|      | 4th       | Define Thermal reservoir. Concept of heat engine, heat pump   |

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|      |     | and refrigerator.  |
| 5th  | 1st | Statement of Second law of thermodynamics (Clausius and Kelvin Planck Statement)                   |
|      | 2nd | Application of second law in heat engine, and determination of efficiency.                         |
|      | 3rd | Application of second law in Refrigerator, and determine the Coefficient Of Performance.           |
|      | 4th | Application of second law in Heat Pump, and determine the Coefficient Of Performance.              |
| 6th  | 1st | Review Class   |
|      | 2nd | Classroom Problems   |
|      | 3rd | Classroom Problems   |
|      | 4th | <i>Assignment evaluation / class test</i>  |
| 7th  | 1st | Explain Laws of Perfect gas, Boyle's law, Charle's law, Avogadro's law,                            |
|      | 2nd | Dalton's law of Partial pressure, Gay-Lussac law, General gas equation                             |
|      | 3rd | Explain Characteristic gas constant, Universal gas constant and define the relation between them.  |
|      | 4th | Define Enthalpy, Entropy, and Internal Energy of a Thermodynamic system.                           |
| 8th  | 1st | Explain specific heat of gas ( $C_p$ and $C_v$ ) Relation between $C_p$ & $C_v$                    |
|      | 2nd | Derive the work done during a non- flow process i.e. Isochoric, Isobaric.                          |
|      | 3rd | Application of first law in Isothermal, Isentropic and Polytrophic Process.                        |
|      | 4th | <i>Assignment evaluation / class test</i>  |
| 9th  | 1st | Classroom Problems   |
|      | 2nd | Classroom Problems   |
|      | 3rd | Define & classify I.C engine   |
|      | 4th | Terminology of I.C Engine  |
| 10th | 1st | Explain the working principle of 4-stroke S.I engine.  |
|      | 2nd | Explain the working principle of 4-stroke C.I engine.  |
|      | 3rd | Explain the working principle of 2-stroke S.I engine.  |
|      | 4th | Explain the working principle of 2-stroke C.I engine.  |
| 11th | 1st | Differentiate between S.I and C.I engine.  |
|      | 2nd | Differentiate between 2-stroke & 4- stroke engine.   |
|      | 3rd | Review class   |
|      | 4th | <i>Assignment evaluation / class test</i>  |
| 12th | 1st | Explain the Carnot cycle with P-V and T-S diagram and derive the process involved in Carnot cycle. |
|      | 2nd | Derive the efficiency of Carnot cycle.   |

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|      | 3rd | Explain the Otto cycle with P-V and T-S diagram and derive the process involved in Otto cycle.     |
|      | 4th | Derive the efficiency of Otto cycle.   |
| 13th | 1st | Explain the Diesel cycle with P-V and T-S diagram and derive the process involved in Diesel cycle. |
|      | 2nd | Derive the efficiency of Diesel cycle.   |
|      | 3rd | Explain the Dual cycle with P-V and T-S diagram and derive the process involved in Dual cycle.     |
|      | 4th | Derive the efficiency of Dual cycle.   |
| 14th | 1st | Classroom Problems   |
|      | 2nd | Classroom Problems   |
|      | 3rd | Define Fuel and its types. Explain application of fuel.  |
|      | 4th | Define Heating value of fuel.  |
| 15th | 1st | Explain Calorific value and Quality of I C engine fuel.  |
|      | 2nd | <i>Discussion on Previous year question paper</i>  |
|      | 3rd | <i>Discussion on Previous year question paper</i>  |
|      | 4th | <i>Discussion on Previous year question paper</i>  |

# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## LESSON PLAN

Session (2023-2024)

|   |  |  |
|---|--|--|
| <b>Discipline:</b><br>Mechanical Engineering<br><br><b>No. of Days/Week: 04</b> | <b>Semester:</b><br>4 <sup>th</sup> , Summer /2024 | <b>Name of the Teaching Faculty: K TRINATH PATRO</b><br><br><b>FLUID</b><br><b>MECHANICS-TH 03</b><br><br><b>Email ID:</b><br><a href="mailto:trinathpatro1994@gmail.com">trinathpatro1994@gmail.com</a> |
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| Week | Class Day | Theory/Practical Topics  |
|------|-----------|--|
| 1st  | 1st       | <b>Properties of fluid:</b><br>Definition and units of fluid properties like density, specific weight, specific volume and specific gravity. |
|      | 2nd       | Numerical  |
|      | 3rd       | Definition and units of fluid properties such as viscosity, kinematic viscosity.   |
|      | 4th       | surface tension and capillarity  |
| 2nd  | 1st       | <b>Fluid pressure and its measurements</b><br>Definitions and units of fluid pressure, pressure intensity and pressure head. Pascal's Law.   |
|      | 2nd       | Concepts of atmospheric, gauge, vacuum and absolute pressure.  |
|      | 3rd       | Pressure Measuring instruments: Manometers (simple, differential and piezometers),   |
|      | 4th       | Numerical  |
| 3rd  | 1st       | Numerical  |
|      | 2nd       | Mechanical Gauges (Bourdon's tube pressure gauge)  |
|      | 3rd       | <i>Doubt clearing Class</i>  |
|      | 4th       | <i>Assignment Evaluation / Class Test</i>  |
| 4th  | 1st       | <b>Hydrostatics</b><br>Definition of hydrostatic pressure, total pressure and centre of pressure.  |
|      | 2nd       | Total pressure and centre of pressure of immersed horizontal bodies  |

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|      | 3rd | Total pressure and centre of pressure of immersed vertical bodies             |
|      | 4th | Numerical   |
| 5th  | 1st | Concept of flotation, buoyancy, centre of buoyancy, Archimedes principle      |
|      | 2nd | Metacentre and metacentric height   |
|      | 3rd | Numerical   |
|      | 4th | <i>Doubt clearing Class</i>   |
| 6th  | 1st | <i>Quiz Test</i>  |
|      | 2nd | <b>Kinematics of Flow</b><br>Types of fluid flow                              |
|      | 3rd | Continuity equation (statement and proof), Numerical                          |
|      | 4th | Numerical   |
| 7th  | 1st | State and Prove Bernoulli's equation,   |
|      | 2nd | Limitations of Bernoulli's theorem  |
|      | 3rd | Numerical   |
|      | 4th | Practical applications of Bernoulli's equation: Venturi meter and Pitot tube. |
| 8th  | 1st | Numerical   |
|      | 2nd | <i>Doubt Clearing class</i>   |
|      | 3rd | <i>Assignment Evaluation / Class Test</i>                                     |
|      | 4th | <b>Orifices, notches &amp; weirs</b><br>Definition of Orifice, Types          |
| 9th  | 1st | Orifice co-efficient and relation among them.                                 |
|      | 2nd | Definition of notch and weir,<br>Classifications of notches & weirs           |
|      | 3rd | Discharge over a rectangular notch or weir.                                   |
|      | 4th | Discharge over a triangular notch or weir                                     |
| 10th | 1st | Numerical   |
|      | 2nd | Numerical   |
|      | 3rd | <i>Doubt Clearing Class</i>   |
|      | 4th | <b>Flow through pipe:</b><br>Darcy-Weisbach formula, Numerical                |
| 11th | 1st | Chezy's formula for loss of head due to friction in pipes. Numerical          |
|      | 2nd | Pipe losses, Hydraulic Gradient, Total Energy Line.                           |
|      | 3rd | Numerical   |
|      | 4th | <i>Doubt Clearing Class</i>   |
| 12th | 1st | <i>Assignment Evaluation / Class Test</i>                                     |

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|      | 2nd | <b>Impact of jets</b><br>Force exerted by the Impact of jet on a stationary vertical plate                        |
|      | 3rd | Numerical   |
|      | 4th | Force exerted by a jet on a moving Vertical flat plate,   |
| 13th | 1st | Numerical   |
|      | 2nd | Derivation of work done on series of vanes and condition for maximum efficiency.                                  |
|      | 3rd | Numerical   |
|      | 4th | Impact of jet on moving curved vanes, illustration using velocity triangles, derivation of work done, efficiency. |
| 14th | 1st | Numerical   |
|      | 2nd | <i>Assignment Evaluation / Class Test</i>   |
|      | 3rd | <i>Doubt Clearing Class</i>   |
|      | 4th | <i>Practice test</i>  |
| 15th | 1st | <i>Practice test</i>  |
|      | 2nd | <i>Revision</i>   |
|      | 3rd | <i>Revision</i>   |
|      | 4th | <i>Discussion of previous year questions</i>  |



# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## LESSON PLAN

### Session (2022-2023)

|   |   |  |
|---|---|--|
| <b>Discipline:</b><br>Mechanical Engineering<br><br><b>No. of Days/Week:</b> 04 | <b>Semester:</b><br>3 <sup>rd</sup> , Winter/2022 | <b>Name of the Teaching Faculty:</b> K TRINATH PATRO<br><br><b>PRODUCTION</b><br><b>TECHNOLOGY-TH 01</b><br><br><b>Email ID:</b><br><a href="mailto:trinathpatro1994@gmail.com">trinathpatro1994@gmail.com</a> |
| <b>Week</b>   | <b>Class Day</b>                                  | <b>Theory Topics</b>   |
| 1 <sup>st</sup>   | 1st   | <b>Metal Forming Processes:</b><br>Hot working and Cold working process, Recrystallisation.<br>Define Extrusion and its Classification.  |
|   | 2nd   | Explain direct and indirect extrusion,   |
|   | 3rd   | Impact extrusion process.  |
|   | 4th   | Define rolling and its Classification. Differentiate between cold rolling and hot rolling process.   |
| 2 <sup>nd</sup>   | 1st   | List the different types of rolling mills used in Rolling process.   |
|   | 2nd   | <i>Doubt Clearing Class</i>  |
|   | 3rd   | <i>Assignment Evaluation</i>   |
|   | 4th   | <b>Powder Metallurgy:</b><br>Define powder metallurgy process.<br>State advantages of powder metallurgy technology technique   |
| 3 <sup>rd</sup>   | 1st   | Describe the methods of producing components by powder metallurgy technique<br>i) Production of metal powders  |
|   | 2nd   | i) Blending<br>ii) Compacting<br>iii) Presintering   |
|   | 3rd   | Explain sintering.<br>Economics of powder metallurgy.  |
|   | 4th   | <i>Doubt Clearing Class</i>  |
| 4 <sup>th</sup>   | 1st   | <i>Class Test</i>  |
|   | 2nd   | <b>Press Work:</b><br>Describe Press Works: blanking, piercing and trimming.   |
|   | 3rd   | List various types of die and punch. Explain Simple die  |
|   | 4th   | Explain Compound & Progressive dies with its advantages & disadvantages  |

|                  |     |   |
|------------------|-----|---|
| 5 <sup>th</sup>  | 1st | Explain Progressive dies with its advantages & disadvantages  |
|                  | 2nd | <i>Doubt Clearing Class</i>   |
|                  | 3rd | <i>Assignment Evaluation</i>  |
|                  | 4th | <b>Jigs and fixtures:</b><br>Define jigs and fixtures. State advantages of using jigs and fixtures.                           |
| 6 <sup>th</sup>  | 1st | State the principle of locations. Describe the methods of location with respect to 3-2-1-point location of rectangular jig.   |
|                  | 2nd | List various types of jig and fixtures.<br>Explain various types of jig.  |
|                  | 3rd | Explain various types of fixtures.  |
|                  | 4th | <i>Doubt Clearing Class</i>   |
| 7 <sup>th</sup>  | 1st | <i>Quiz Test</i>  |
|                  | 2nd | <b>Welding:</b><br>Define welding and classify various welding processes.   |
|                  | 3rd | Explain fluxes used in welding.   |
|                  | 4th | Explain Oxy-acetylene welding process. Explain various types of flames used in Oxy-acetylene welding process.                 |
| 8 <sup>th</sup>  | 1st | Explain Arc welding process.  |
|                  | 2nd | Specify arc welding electrodes.   |
|                  | 3rd | Doubt Clearing Class  |
|                  | 4th | Define resistance welding and classify it.  |
| 9 <sup>th</sup>  | 1st | Describe various resistance welding processes such as spot welding and seam welding   |
|                  | 2nd | Flash welding and projection welding.   |
|                  | 3rd | Explain TIG welding process   |
|                  | 4th | Explain MIG welding process   |
| 10 <sup>th</sup> | 1st | State different welding defects with causes and remedies.   |
|                  | 2nd | Testing of welded joints  |
|                  | 3rd | <i>Doubt Clearing Class</i>   |
|                  | 4th | <i>Assignment Evaluation &amp; Class Test</i>   |
| 11 <sup>th</sup> | 1st | <b>Casting:</b><br>Define Casting and Classify the various Casting processes.<br>Explain the procedure of Sand mould casting. |
|                  | 2nd | Explain different types of moulding sands with their composition and properties.  |
|                  | 3rd | Pattern and classify different types of patterns  |
|                  | 4th | state various pattern allowances.   |
| 12 <sup>th</sup> | 1st | Classify core and explain its construction.   |
|                  | 2nd | Describe construction and working of cupola furnace.  |

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|                  | 3rd | Describe construction and working of crucible furnace.  |
|                  | 4th | <i>Doubt Clearing class</i>   |
| 13 <sup>th</sup> | 1st | Explain hot chamber die casting method with relative advantages, disadvantages and field of application.                        |
|                  | 2nd | Explain cold chamber die casting method with relative advantages, disadvantages and field of application.                       |
|                  | 3rd | Explain centrifugal casting such as true centrifugal casting, centrifuging with advantages, limitation and area of application. |
|                  | 4th | Explain Investment casting with relative advantages, limitation and area of application.  |
| 14 <sup>th</sup> | 1st | Explain various casting defects with their causes and remedies.   |
|                  | 2nd | Explain Inspection of casting. Economics of casting   |
|                  | 3rd | <i>Doubt Clearing class</i>   |
|                  | 4th | <i>Assignment Evaluation &amp; Quiz Test</i>  |
| 15 <sup>th</sup> | 1st | <i>Practice Test</i>  |
|                  | 2nd | <i>Revision</i>   |
|                  | 3rd | <i>Revision</i>   |
|                  | 4th | <i>Discussion of Previous Year Questions</i>  |



# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

Department of Mechanical Engineering

## LESSON PLAN

|                      |                               |                                 |                                |
|----------------------|-------------------------------|---------------------------------|--------------------------------|
| <b>Subject</b>       | <b>Environmental Studies</b>  |                                 |                                |
| <b>Branch</b>        | <b>Mechanical Engineering</b> | <b>Name of the Faculty</b>      | <b>K Trinath Patro</b>         |
| <b>Course Code</b>   | <b>Th-5</b>                   | <b>Semester</b>                 | <b>3<sup>rd</sup> Semester</b> |
| <b>Total Periods</b> | <b>60</b>                     | <b>Examination</b>              | <b>2022</b>                    |
| <b>Theory Period</b> | <b>4P/ W</b>                  | <b>Class Test</b>               | <b>20 Marks</b>                |
| <b>Maximum Marks</b> | <b>100 Marks</b>              | <b>End Semester Examination</b> | <b>80 Marks</b>                |

| <b>Week</b> | <b>Class Day</b> | <b>Theory Topics</b>   |
|-------------|------------------|--|
| 1st         | 1st              | Definition, scope, and importance of Environmental Studies   |
|             | 2nd              | Need for public awareness.   |
|             | 3rd              | <i>Doubt Clearing class</i>  |
|             | 4th              | Forest resources: Use and over-exploitation  |
| 2nd         | 1st              | Forest resources: deforestation, case studies, Timber extraction.  |
|             | 2nd              | Mining, dams and their effects on forests and tribal people.   |
|             | 3rd              | Water resources: Use and over-utilization of surface and ground water, floods.                                   |
|             | 4th              | Drought, conflicts over water, dams benefits and problems  |
| 3rd         | 1st              | Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources         |
|             | 2nd              | Food Resources: World food problems, changes caused by agriculture and over grazing.                             |
|             | 3rd              | Effects of modern agriculture, fertilisers-pesticides problems, water logging, salinity.                         |
|             | 4th              | Energy Resources: Growing energy need, renewable and non-renewable energy.                                       |
| 4th         | 1st              | Difference between renewable and nonrenewable energy source  |
|             | 2nd              | Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, and desertification. |
|             | 3rd              | Soil erosion and desertification   |
|             | 4th              | <i>Doubt Clearing class</i>  |

|      |     |   |
|------|-----|---|
| 5th  | 1st | <i>Assignment Evaluation &amp; Class Test</i>   |
|      | 2nd | <i>QUIZ Test-1</i>  |
|      | 3rd | Concept of an eco-system. Structure and function of an eco-system. Producers, consumers, decomposers  |
|      | 4th | Producers, consumers, decomposers.  |
| 6th  | 1st | Energy flow in Ecosystem  |
|      | 2nd | Ecological succession Food chains   |
|      | 3rd | Food webs and ecological pyramid  |
|      | 4th | Introduction, types, characteristic features, structure and function of the following eco system: Forest ecosystem: Aquatic eco systems (ponds, streams, lakes) |
| 7th  | 1st | Forest ecosystem.   |
|      | 2nd | Aquatic eco systems-  |
|      | 3rd | Aquatic eco systems- rivers, Oceans, estuaries  |
|      | 4th | <i>Doubt Clearing class</i>   |
| 8th  | 1st | <i>Assignment Evaluation &amp; Class Test</i>   |
|      | 2nd | Introduction-Definition: genetics, species and ecosystem diversity.   |
|      | 3rd | Biogeographically classification of India.  |
|      | 4th | Biodiversity at global  |
|      | 1st | Threats to biodiversity: Habitats loss  |
|      | 2nd | <i>Doubt Clearing class</i>   |
|      | 3rd | Define Environmental pollution & types of pollution.  |
|      | 4th | Air pollution- Sources, Effects, and control  |
| 10th | 1st | Water pollution- Sources, Effects and control   |
|      | 2nd | Soil pollution- Sources, Effects and control  |
|      | 3rd | Marine pollution- Sources, Effects, and control   |
|      | 4th | Noise pollution- Sources, Effects, and control  |
| 11th | 1st | Thermal pollution- Sources, Effects, and control  |
|      | 2nd | Nuclear hazards- Sources, Effects, and control  |
|      | 3rd | <i>Doubt Clearing class</i>   |
|      | 4th | Assignment evaluation, class test   |
| 12th | 1st | <i>QUIZ Test-11</i>   |
|      | 2nd | Form unsustainable to sustainable development   |
|      | 3rd | Urban problems related to energy.   |
|      | 4th | Water conservation, rain water harvesting, water shed management.   |

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|------|-----|---|
| 13th | 1st | Resettlement and rehabilitation of people; its problems and concern   |
|      | 2nd | Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies |
|      | 3rd | Air and water (prevention and control of pollution) Act.  |
|      | 4th | Public awareness  |
| 14th | 1st | Population growth and variation among nations.  |
|      | 2nd | Population explosion- family welfare program.   |
|      | 3rd | Environment and human health, Human rights and Value education  |
|      | 4th | Role of information technology in environment and human health  |
| 15th | 1st | <i>Doubt Clearing class</i>   |
|      | 2nd | <i>Assignment Evaluation &amp; Class Test</i>   |
|      | 3rd | <i>Discussion of Previous year questions</i>  |
|      | 4th | <i>Discussion of Previous year questions</i>  |



# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## Department of Mechanical Engineering

### LESSON PLAN

|                      |                                  |                                 |                        |
|----------------------|----------------------------------|---------------------------------|------------------------|
| <b>Subject</b>       | <b>Power Station Engineering</b> |                                 |                        |
| <b>Branch</b>        | <b>Mechanical Engineering</b>    | <b>Name of the Faculty</b>      | <b>K Trinath Patro</b> |
| <b>Course Code</b>   | <b>Th-3</b>                      | <b>Semester</b>                 | <b>6th Semester</b>    |
| <b>Total Periods</b> | <b>60</b>                        | <b>Examination</b>              | <b>2023</b>            |
| <b>Theory Period</b> | <b>4P/ W</b>                     | <b>Class Test</b>               | <b>20 Marks</b>        |
| <b>Maximum Marks</b> | <b>100 Marks</b>                 | <b>End Semester Examination</b> | <b>80 Marks</b>        |

| Week | ClassDay | Theory/PracticalTopics  |
|------|----------|---|
| 1st  | 1st      | Differentsourcesofenergy.IntroductiontoPowerPlants.Classificationof power plants.                                   |
|      | 2nd      | ConceptofCentralandCaptivestations.Importanceofelectrical power in day today life.                                  |
|      | 3rd      | Variousmethodsofelectricalpowergeneration   |
|      | 4th      | Layoutofsteampowerstation   |
| 2nd  | 1st      | ExplanationsofCarnotvapourpowercyclewithP-V,T-sdiagramand determination of thermal efficiency.                      |
|      | 2nd      | NumericalonCarnotvapourpower cycle  |
|      | 3rd      | ExplanationsofRankinecyclewithP-V,T-sandH-sdiagramandstudy of performance of steam power plant                      |
|      | 4th      | Determinationofthermalefficiency,workdone,workratio,andspecific steam Consumption for Rankine cycle                 |
| 3rd  | 1st      | NumericalonRankinecycle   |
|      | 2nd      | Boiler–itsfunction,typesandoperation  |
|      | 3rd      | Boilermountings–need,typesandtheirfunctions   |
|      | 4th      | BoilerAccessories:OperationofAirpreheater,Economiser,superheater, Electrostatic precipitator                        |
| 4th  | 1st      | Steamprimemovers:Advantages&disadvantagesofsteamturbine, Elements of steam turbine, Classification                  |
|      | 2nd      | Workingofsteamturbines.Performanceofsteamturbine–Explain Thermal efficiency, Stage efficiency and Gross efficiency. |
|      | 3rd      | Governingofsteamturbine.  |
|      | 4th      | Steamcondenser:Functionofcondenser,Classificationofcondenser.   |
| 5th  | 1st      | Functionofcondenserauxiliariessuchashotwell,condenserextraction pump, air extraction pump, and circulating pump.    |

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|------|-----|--|
|      | 2nd | Cooling Tower: Function and types of cooling tower, and spray ponds  |
|      | 3rd | Draught systems (Natural draught, Forced draught & balanced draught) with their advantages & disadvantages                                       |
|      | 4th | Selection of site for thermal power stations. List of thermal power stations in the state with their capacities                                  |
| 6th  | 1st | <i>Class Test, Assignment-1</i>  |
|      | 2nd | <i>Doubt Clearing Class</i>  |
|      | 3rd | <i>Doubt Clearing Class</i>  |
|      | 4th | <i>QUIZ Test-1</i>   |
| 7th  | 1st | Introduction to Nuclear Power plant. Classification of nuclear fuels (Fissile & fertile material). Fusion and Fission reactions. Nuclear energy. |
|      | 2nd | Elements of nuclear power plants & Block diagram, Working  |
|      | 3rd | Working and construction of nuclear reactor  |
|      | 4th | List of nuclear power stations. Compare the nuclear and thermal plants.  |
| 8th  | 1st | Explain the disposal of nuclear waste. Selection of site for nuclear power stations  |
|      | 2nd | Introduction to diesel electric power stations. Advantages and disadvantages of diesel electric power stations.                                  |
|      | 3rd | Components of diesel electric power stations.  |
|      | 4th | Fuel storage and fuel supply system, Fuel injection system   |
| 9th  | 1st | Air supply system, Exhaust system and Starting system  |
|      | 2nd | Cooling and lubrication system   |
|      | 3rd | Governing system. Selection of site for diesel electric power stations   |
|      | 4th | Performance and thermal efficiency of diesel electric power stations   |
| 10th | 1st | Numerical  |
|      | 2nd | <i>Doubt Clearing Class</i>  |
|      | 3rd | Introduction to hydroelectric power plant and its advantages and disadvantages.  |
|      | 4th | General arrangement of storage type hydroelectric project and its operation.   |
| 11th | 1st | Selection of site of hydro power plant   |
|      | 2nd | List of hydro power stations with their capacities and number of units in the state  |
|      | 3rd | Types of hydro-turbines and generator used   |
|      | 4th | Introduction to gas turbine power station. Merits, demerits and application of gas turbine power plants  |
| 12th | 1st | Fuels for gas turbine. Selection of site for gas turbine stations  |
|      | 2nd | Elements of simple gas turbine power plants, Working   |
|      | 3rd | <i>Class Test, Assignment-2</i>  |
|      | 4th | <i>Doubt Clearing Class</i>  |
| 13th | 1st | <i>Doubt Clearing Class</i>  |
|      | 2nd | <i>Quiz Test-2</i>   |
|      | 3rd | Revision – Chapter-1   |
|      | 4th | Revision – Chapter-2   |



|                  |     |                    |
|------------------|-----|--------------------|
| 14 <sup>th</sup> | 1st | Revision-Chapter-3 |
|                  | 2nd | Revision-Chapter-4 |
|                  | 3rd | Revision-Chapter-5 |
|                  | 4th | Revision-Chapter-6 |

# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## LESSON PLAN

Session (2022-2023)

|   |   |  |
|---|---|--|
| <b>Discipline:</b><br>Mechanical Engineering<br><br><b>No. of Days/week:</b> 04 | <b>Semester:</b><br><br>5 <sup>th</sup> , Winter/2022 | <b>Name of the Teaching Faculty:</b><br>SIMANCHALA PANDA<br><br><b>Hydraulic Machine &amp;<br/>Industrial Fluid Power TH- 03</b><br><br><b>Email ID:</b><br><a href="mailto:simanchal.panda.1@gmail.com">simanchal.panda.1@gmail.com</a> |
|---|---|--|

| Week | Class Day | Theory/Practical Topics  |
|------|-----------|--|
| 1st  | 1st       | Introduction to hydraulic machine - Hydraulic turbine and Hydraulic pump, their importance, and applications.  |
|      | 2nd       | Classification of hydraulic turbines   |
|      | 3rd       | Construction and working principle of impulse turbine (Pelton wheel)   |
|      | 4th       | Velocity diagram of moving blades. Determination of work done.   |
| 2nd  | 1st       | Efficiencies of Pelton turbine. Numerical for Pelton turbine   |
|      | 2nd       | Numerical based on Pelton turbine.   |
|      | 3rd       | Construction and working principle of Francis turbine  |
|      | 4th       | Velocity diagram of moving blades. Determination of work done and efficiencies of Francis turbine.   |
| 3rd  | 1st       | Numerical based on Francis turbine.  |
|      | 2nd       | <i>Doubt Clearing class</i>  |
|      | 3rd       | Construction and working principle of Kaplan turbine   |
|      | 4th       | Velocity diagram of moving blades. Determination of work done and efficiencies of Kaplan turbine.  |
| 4th  | 1st       | Numerical based on Kaplan turbine  |
|      | 2nd       | Difference between Impulse and Reaction turbine, Draft tube  |
|      | 3rd       | <i>Doubt Clearing class</i>  |
|      | 4th       | <i>Class Test</i>  |
| 5th  | 1st       | What is Centrifugal pump? Construction and working principle of centrifugal pump.  |
|      | 2nd       | Velocity diagram of moving blades, work done and efficiencies of Centrifugal pump  |
|      | 3rd       | Numerical based on Centrifugal pump  |
|      | 4th       | <i>Doubt Clearing class</i>  |
| 6th  | 1st       | <i>QUIZ Test-1</i>   |
|      | 2nd       | <i>Class Test/Assignment-01</i>  |
|      | 3rd       | Reciprocating pump: Classification, application & working Principle  |
|      | 4th       | Construction and working principle of single acting and double acting reciprocating pump.  |
| 7th  | 1st       | Determination of discharge and Power required for the pump (single & double acting). Define Slip, positive and negative slip, Relation between slip and coefficient of discharge |
|      | 2nd       | Numerical on above   |

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|------------------|-----|--|
|                  | 3rd | <i>Doubt Clearing class</i>  |
|                  | 4th | Introduction to Pneumatic system, Application                                    |
| 8 <sup>th</sup>  | 1st | Elements of Pneumatic system: Air Filter, Air regulator and Air lubricator       |
|                  | 2nd | Pressure control valves:   |
|                  | 3rd | Direction control valves: 3/2 DCV, 5/2 DCV. 5/3 DCV                              |
|                  | 4th | Flow control valves, Throttle valves   |
| 9 <sup>th</sup>  | 1st | ISO symbols for pneumatic circuits   |
|                  | 2nd | Pneumatic circuits   |
|                  | 3rd | Operation and Control of single acting cylinder                                  |
|                  | 4th | Operation and Control of double acting cylinder                                  |
| 10 <sup>th</sup> | 1st | Operation of double acting cylinder with Metering in and Metering out control    |
|                  | 2nd | <i>Doubt Clearing class</i>  |
|                  | 3rd | <i>Class Test</i>  |
|                  | 4th | Hydraulic system - its merit and demerit, Elements of Hydraulic system           |
| 11 <sup>th</sup> | 1st | Hydraulic Accumulators   |
|                  | 2nd | Pressure control valve, Relief valve, Regulation valve                           |
|                  | 3rd | Direction control valve: 3/2 DCV, 5/2 DCV. 5/3 DCV                               |
|                  | 4th | Flow control valves, Throttle valves   |
| 12 <sup>th</sup> | 1st | Gear Pumps – Working principle and their uses. External and Internal gear pumps. |
|                  | 2nd | Vane pump – Working principle and uses   |
|                  | 3rd | Radial piston pump – Working principle and uses                                  |
|                  | 4th | Actuators: Function, types, Working of Actuators                                 |
| 13 <sup>th</sup> | 1st | ISO symbols for hydraulic components. Hydraulic circuits                         |
|                  | 2nd | Operation and Control of single acting cylinder                                  |
|                  | 3rd | Operation and Operation of double acting cylinder                                |
|                  | 4th | Operation of double acting cylinder with Metering in and Metering out control    |
| 14 <sup>th</sup> | 1st | Comparison of hydraulic and pneumatic system                                     |
|                  | 2nd | <i>Doubt Clearing class</i>  |
|                  | 3rd | <i>QUIZ Test-2</i>   |
|                  | 4th | <i>Class Test/Assignment-02</i>  |
| 15 <sup>th</sup> | 1st | <i>Revision: Chapter-1</i>   |
|                  | 2nd | <i>Revision: Chapter-2</i>   |
|                  | 3rd | <i>Revision: Chapter-3</i>   |
|                  | 4th | <i>Revision: Chapter-4</i>   |

# KIIT POLYTECHNIC, BHUBANESWAR

## LESSON PLAN

Session (2022-2023)

|   |   |   |
|---|---|---|
| <b>Discipline:</b><br>Mechanical Engineering<br><br><b>No. of Days/Week: 04</b> | <b>Semester:</b><br>5 <sup>th</sup> , Winter/2022 | <b>Name of the Teaching Faculty:</b><br>SIMANCHAL<br>PANDA<br>Mechatronics TH -04<br><br><b>Email ID:</b><br><a href="mailto:simanchal.panda.1@gmail.com">simanchal.panda.1@gmail.com</a> |
|---|---|---|

| Week | Class Day | Theory/Practical Topics   |
|------|-----------|---|
| 1st  | 1st       | <b>INTRODUCTION TO MECHATRONICS:</b><br>Definition, Advantages & disadvantages of Mechatronics. |
|      | 2nd       | Application of Mechatronics, Importance of mechatronics in automation.                          |
|      | 3rd       | Components of a Mechatronics System   |
|      | 4th       | <i>Review class and Discussion</i>  |
| 2nd  | 1st       | <b>ROBOTICS:</b><br>Definition, Function and laws of robotics                                   |
|      | 2nd       | Types of industrial robots, Advantages, Disadvantages and Applications of robots                |
|      | 3rd       | Robotic systems   |
|      | 4th       | <i>Review class and Discussion</i>  |
| 3rd  | 1st       | <i>Assignment Evaluation &amp; Class Test</i>   |
|      | 2nd       | <b>SENSORS AND TRANSDUCERS:</b>   |
|      | 3rd       | Definition and classification of transducer   |
|      | 4th       | Classification of Transducer  |
| 4th  | 1st       | Electromechanical Transducers   |
|      | 2nd       | Transducers Actuating Mechanisms  |
|      | 3rd       | Sensors and its classifications   |
|      | 4th       | Displacement & Positions Sensors  |
| 5th  | 1st       | Velocity and Motion sensors   |
|      | 2nd       | Force and Pressure sensors.   |
|      | 3rd       | Temperature sensors   |
|      | 4th       | Light sensors   |
| 6th  | 1st       | <i>Review class and Discussion</i>  |

|      |     |  |
|------|-----|--|
|      | 2nd | <i>Assignment Evaluation &amp; Quiz Test</i>                                   |
|      | 3rd | <b>ELEMENTS OF CNC MACHINES:</b> Introduction to Numerical Control of machines |
|      | 4th | NC machines  |
| 7th  | 1st | CNC machine  |
|      | 2nd | CAD and CAM  |
|      | 3rd | Software and hardware for CAD/CAM, Functioning of CAD/CAM system               |
|      | 4th | Features and characteristics of CAD/CAM system, Application areas for CAD/CAM  |
| 8th  | 1st | <i>Review class and Discussion</i>   |
|      | 2nd | <b>Introduction to CNC Machines,</b> Elements of CNC machines                  |
|      | 3rd | Machine Structure  |
|      | 4th | Guideways/Slide ways and its types   |
| 9th  | 1st | Drives and types, Spindle drives   |
|      | 2nd | Feed drive   |
|      | 3rd | Spindle and Spindle Bearings   |
|      | 4th | <i>Review class and Discussion</i>   |
| 10th | 1st | <i>Class Test</i>  |
|      | 2nd | <b>PROGRAMMABLE LOGIC CONTROLLERS(PLC):</b>                                    |
|      | 3rd | Introduction, Definition and Advantages of PLC, Selection and uses of PLC      |
|      | 4th | Architecture basic internal structures   |
| 11th | 1st | Input/output Processing and Programming  |
|      | 2nd | Mnemonics, Master and Jump Controllers   |
|      | 3rd | <i>Review class and Discussion</i>   |
|      | 4th | <i>Assignment Evaluation &amp; Class Test</i>                                  |
| 12th | 1st | <b>MECHANICAL ACTUATORS:</b>   |
|      | 2nd | Machine, Kinematic Link, Kinematic Pair  |
|      | 3rd | Mechanism, Slider crank Mechanism  |
|      | 4th | Gear Drive, Spur gear, Bevel gear, Helical gear, worm gear                     |
| 13th | 1st | Belt & Belt drive  |
|      | 2nd | <b>Electrical Actuator:</b> Switches and relays, Solenoids                     |
|      | 3rd | D.C Motors   |
|      | 4th | A.C Motors   |
| 14th | 1st | Stepper Motors, Specification and control of stepper motors                    |
|      | 2nd | Servo Motors D.C & A.C   |
|      | 3rd | <i>Review class</i>  |

|      |     |  |
|------|-----|--|
|      | 4th | <i>Assignment Evaluation &amp; Quiz Test</i> |
| 15th | 1st | <i>Class Test</i>                            |
|      | 2nd | <i>Revision</i>                              |
|      | 3rd | <i>Revision</i>                              |
|      | 4th | <i>Discussion of Previous Year Questions</i> |

**Signature of Concerned Teacher**

**HoD**

**Department of  
Mechanical Engineering**

# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## LESSONPLAN Session(2023-2024)

|  |   |   |
|--|---|---|
| <b>Discipline:</b><br>Mechanical<br>Engineering<br><br>No. of Days/week:04 | <b>Semester:</b><br><br>4 <sup>th</sup> , Summer/2024 | <b>Name of the Faculty:</b><br>SIMANCHALA PANDA<br><br>Manufacturing<br>Technology-TH 02<br><br>Email ID:<br><a href="mailto:simanchal.panda.1@gmail.com">simanchal.panda.1@gmail.com</a> |
|--|---|---|

| Week | ClassDay | TheoryTopics  |
|------|----------|---|
| 1st  | 1st      | Typesoftoolmaterial,desirableproperties,StateCompositionof varioustoolmaterials   |
|      | 2nd      | Statephysicalproperties&usesof toolmaterials  |
|      | 3rd      | Typesofcuttingtool,toolnomenclature   |
|      | 4th      | Statepurposeof providingdifferenttoolandspecifytheangelsfor differentmaterialstobe machined                             |
| 2nd  | 1st      | DoubtClearingClass  |
|      | 2nd      | Toolgeometry(ASASystemandORSSystem)   |
|      | 3rd      | Describetoolgeometryofturningtool&millingcutter   |
|      | 4th      | ExplainscuttingactionofvarioushandtoolssuchasChisel,hacksaw blade   |
| 3rd  | 1st      | Statethepurposeofusingcoolants&lubricants   |
|      | 2nd      | Specifyvariouscoolantsandlubricants   |
|      | 3dr      | DoubtClearingClass  |
|      | 4th      | Assignmentevaluation,classtest.   |
| 4th  | 1st      | S.S &S.Clathe,Define S.S &S.Clathe Identifythedifferentpartsoflathe&theirfunctions                                      |
|      | 2nd      | DifferentpartsofLatheandtheirfunction.Explainthefunction of differentcomponentsofcapstanlathe Definemultipletoolholders |
|      | 3dr      | EnlistthedifferentoperationsonlatheState &explainturning,grooving   |

|      |     |  |
|------|-----|--|
|      | 4th | Stepturning,threadcutting,tapeturning,partingoff   |
| 5th  | 1st | DifferentoperationofLathemachine   |
|      | 2nd | Explainthefunctionofdifferentcomponents ofcapstanlatheDefine multiple tool holders               |
|      | 3rd | ExplainthefunctionsofdifferentcomponentsofTurretLathe  |
|      | 4th | Explaintheindexingarrangementforturrethead,Explainwith neat sketchthefeedingmechanism            |
| 6th  | 1st | DifferencebetweenCapstanandTurretLathe.Drawthetoolinglayout forpreparationofa hexagonalbolt&bush |
|      | 2nd | AdvantageofCapstan&turretlathe overS.S&S.Clathe.Describeparts, typesandfunctionoflathemachine    |
|      | 3rd | DoubtClearingClass   |
|      | 4th | Assignmentevaluation,classtest.  |
| 7th  | 1st | Quiz-1   |
|      | 2nd | Listoutthedifferentparts,Describethe functions ofpartsofShaper machine                           |
|      | 3rd | Explainthequickreturnmechanismthroughsketch,crankandslotted link mechanism                       |
|      | 4th | crankandslottedlinkmechanismandHydraulicmechanism  |
| 8th  | 1st | Explaintheconstruction&workingoftoolheadandtheautomatictable feedmechanism                       |
|      | 2nd | Statethespecificationofashapingmachine   |
|      | 3rd | Enlistdifferentparts,DescribeandexplainthefunctionofpartsofPlanar machine                        |
|      | 4th | Explainthetabledrivesmechanism   |
| 9th  | 1st | Explaintheworkingoftoolandtoolsupport.Explaintheclampingof workthroughsketch                     |
|      | 2nd | EnlistthedifferentpartsnSpecifyvarioustoolsofslottermachine                                      |
|      | 3rd | Explaintheconstruction&workingofslottermachine   |
|      | 4th | DoubtClearingclass   |
| 10th | 1st | Definegrinding,Explainmanufacturingofgrindingwheels  |
|      | 2nd | StateCriteriaforselectingofgrindingwheelsandAbrasives,Bond, Grade,Grain,Grit,Structure           |
|      | 3rd | Explainspecificationofgrindingwheelswithexample  |



|      |     |   |
|------|-----|---|
|      | 4th | Explain working of Cylindrical Grinder  |
| 11th | 1st | Explain Surface Grinder and Centreless Grinder  |
|      | 2nd | Doubt Clearing class  |
|      | 3rd | <i>Assignment Evaluation &amp; Class Test</i>   |
|      | 4th | Quiz-2  |
| 12th | 1st | Classify of drilling, Bench drilling, Pillar drilling machine and Radial drilling machine                   |
|      | 2nd | Basic Principle of Boring, Difference between Boring and drilling Types of Broaching (pull type, push type) |
|      | 3rd | Advantages & Application of Broaching.  |
|      | 4th | Doubt Clearing & Practice Class   |
| 13th | 1st | Define Surface finish, Define superfinishing  |
|      | 2nd | Describe lapping & explain their specific cutting.  |
|      | 3rd | Various types of milling machine, Explain work holding attachment   |
|      | 4th | Describe construction & working of simple dividing head, universal dividing head                            |
| 14th | 1st | Doubt Clearing Class  |
|      | 2nd | Describe the different numerical indexing procedure and show one example from each indexing method.         |
|      | 3rd | Direct indexing, Simple indexing, Compound indexing   |
|      | 4th | Angular indexing and differential indexing  |
| 15th | 1st | <i>Doubt Clearing class</i>   |
|      | 2nd | <i>Assignment Evaluation &amp; Class Test</i>   |
|      | 3rd | <i>Discussion of Previous year questions</i>  |
|      | 4th | <i>Discussion of Previous year questions</i>  |

# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## LESSON PLAN

Session (2022-2023)

|  |   |  |
|--|---|--|
| <b>Discipline:</b><br>Mechanical                     | <b>Semester:</b><br>3 <sup>rd</sup> , Winter/2022 | <b>Name of the Teaching Faculty:</b><br>SIMANCHALA PANDA |
| <b>Subject:</b><br>Strength of Material,<br>Theory-2 | <b>No. of Days/Week:</b><br>04                    | Class Test: 20<br>End Semester Examination: 80           |

| Week            | Class Day | Theory/Practical Topics   |
|-----------------|-----------|---|
| 1st             | 1st       | Strength of Material-Introduction. Load, stress & strain, and their types.  |
|                 | 2nd       | Stress ~ Strain Diagram. Lateral strain and Linear strain. Poisson's ratio.   |
|                 | 3rd       | Hooke's law. Elastic constants: Young's modulus, bulk modulus, and modulus of rigidity. Relation between E&K.   |
|                 | 4th       | Relation between E&C. Relation between three elastic constants (E, C and K)   |
| 2nd             | 1st       | Numerical: Determination of stress, strain, elongation and Poisson's ratio.   |
|                 | 2nd       | Numerical: Determination of Elastic constants and Poisson's ratio.  |
|                 | 3rd       | Principle of super position: Numerical  |
|                 | 4th       | Stresses in composite section: Numerical  |
| 3rd             | 1st       | Temperature stress and strain, Temperature stress in composite bar (single core): Numerical   |
|                 | 2nd       | Composite section subjected to thermal stress and strain: Numerical   |
|                 | 3rd       | Strain energy and resilience, Stress due to gradually applied, suddenly applied and impact load   |
|                 | 4th       | Doubt Clearing Class  |
| 4th             | 1st       | Thin cylindrical shell. Assumption. Hoop stress and longitudinal stress. Failure of thin cylindrical shell. Determination of hoop stress and longitudinal stress. |
|                 | 2nd       | Numerical to find safe pressure, thickness and diameter.  |
|                 | 3rd       | Determination of Hoop strain, longitudinal strain and volumetric strain; Change in length, diameter and volume of thin cylindrical shell.                         |
|                 | 4th       | Numerical to find change in dimensions of thin cylindrical shell.   |
| 5 <sup>th</sup> | 1st       | Class test/Assignment-01  |
|                 | 2nd       | Types of beams and loads. Shear force and bending moment. Sign convention.  |
|                 | 3rd       | Numerical to determine Shear Force and Bending moment diagram in cantilever beam subjected to point load.   |
|                 | 4th       | Numerical to determine Shear Force and Bending moment diagram in cantilever beam subjected to U.D.L   |

|                  |     |  |
|------------------|-----|--|
| 6 <sup>th</sup>  | 1st | Numerical to determine Shear Force and Bending moment diagram in simply supported beam subjected to point load.  |
|                  | 2nd | Numerical to determine Shear Force and Bending moment diagram in simply supported beam subjected U.D.L.  |
|                  | 3rd | Numerical to determine Shear Force and Bending moment diagram in overhanging beam subjected to point load.   |
|                  | 4th | Numerical to determine Shear Force and Bending moment diagram in overhanging beam subjected U.D.L.   |
| 7 <sup>th</sup>  | 1st | Doubt Clearing Class   |
|                  | 2nd | QUIZ Test-1  |
|                  | 3rd | Simple bending: Introduction, Assumption, Position of neutral axis.  |
|                  | 4th | Theory of simple bending (Derivation of bending equation)  |
| 8 <sup>th</sup>  | 1st | Section modulus, Moment of inertia, Numerical.   |
|                  | 2nd | Numerical  |
|                  | 3rd | Define column, types of columns, Axial load, Eccentric load, Slenderness ratio, Buckling load.   |
|                  | 4th | Direct stresses, Bending stresses, Maximum & Minimum stresses in short column: for uniaxial and biaxial system   |
| 9 <sup>th</sup>  | 1st | Buckling load computation using Euler's formula (no derivation) in Columns with various end conditions   |
|                  | 2nd | Numerical  |
|                  | 3rd | Doubt Clearing Class   |
|                  | 4th | Torsion in shafts, Assumption of pure torsion  |
| 11 <sup>th</sup> | 1st | Theory of pure torsion (Derivation of bending equation)  |
|                  | 2nd | Strength of solid and hollow shafts. Polar moment of inertia and Polar modulus.  |
|                  | 3rd | Power transmission in solid and hollow shafts. Torsional rigidity. Combined bending and twisting.  |
|                  | 4th | Numerical  |
| 12 <sup>th</sup> | 1st | Numerical  |
|                  | 2nd | Quiz Test-2  |
|                  | 3rd | Introduction to 2-dimensional stress system; Concept of Principal plane, Principal stress and strain; Stresses in oblique plane  |
|                  | 4th | Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (i) direct stress in one direction only. Numerical  |
| 13 <sup>th</sup> | 1st | Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (ii) direct stress in two perpendicular directions. Numerical                             |
|                  | 2nd | Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (iii) shear stress only; Numerical  |
|                  | 3rd | Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (iv) direct stress in one direction and followed by shear stress. Problem                 |
|                  | 4th | Determination of normal stress, shear stress and resultant stress on an oblique plane of a body which subjected to (iv) direct stress in two perpendicular directions and followed by shear stress. Problem. |

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|------------------|-----|---|
| 14 <sup>th</sup> | 1st | Concept of Mohr's circle. Mohr's circle Problems. |
|                  | 2nd | Mohr's circle Problems.                           |
|                  | 3rd | Doubt Clearing Class                              |
|                  | 4th | Class test/Assignment-2                           |
| 15 <sup>th</sup> | 1st | Revision/Doubt Clearing Classes                   |
|                  | 2nd | Revision/Doubt Clearing Classes                   |
|                  | 3rd | Revision/Doubt Clearing Classes                   |
|                  | 4th | Revision/Doubt Clearing Classes                   |

# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## Lesson Plan

|  |                                 |   |
|--|---------------------------------|---|
| Discipline:<br><b>Mechanical<br/>Engineering</b>   | Semester: <b>6th</b>            | FACULTY: <b>SIMANCHALA PANDA</b>  |
| Subject<br>Adv.<br>Manufacturing<br>Process- Th 4b | No. Of Days/Week<br>Allotted: 4 | E-MAIL ID- <b>simanchal.panda.1@gmail.com</b>   |
| <b>Week</b>  | <b>Class Day</b>                | <b>Theory Topics</b>  |
| <b>1<sup>st</sup></b>                              | <b>1<sup>st</sup></b>           | <b>Module 1.Non conventional machining process:</b> What is Non-conventional machining process? Difference between Conventional and non-conventional machining. Types of non-conventional machining |
|  | <b>2<sup>nd</sup></b>           | Ultrasonic Machining: principle, Description of equipment, applications   |
|  | <b>3<sup>rd</sup></b>           | Electric Discharge Machining: Principle, Description of equipment, Dielectric fluid, tools (electrodes), Process parameters, Output characteristics, applications.                                  |
|  | <b>4<sup>th</sup></b>           | Abrasive Jet Machining: principle, description of equipment, Material removal rate, application.  |
| <b>2<sup>nd</sup></b>                              | <b>1<sup>st</sup></b>           | Laser Beam Machining: principle, description of equipment, Material removal rate, application.  |
|  | <b>2<sup>nd</sup></b>           | Electro Chemical Machining: principle, description of equipment, Material removal rate, application.  |
|  | <b>3<sup>rd</sup></b>           | Electro Chemical Machining: principle, description of equipment, Material removal rate, application.  |
|  | <b>4<sup>th</sup></b>           | Plasma Arc Machining – principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications   |
| <b>3<sup>rd</sup></b>                              | <b>1<sup>st</sup></b>           | Plasma Arc Machining – principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications   |
|  | <b>2<sup>nd</sup></b>           | Electron Beam Machining - principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications  |
|  | <b>3<sup>rd</sup></b>           | Electron Beam Machining - principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications  |
|  | <b>4<sup>th</sup></b>           | Topic end, Question answer discussion, Assignment 1   |
| <b>4<sup>th</sup></b>                              | <b>1<sup>st</sup></b>           | <b>Module2.Plastic Processing</b> Introduction,thermoset and thermoplast plastic.   |

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|------------------|-----------------|--|
|                  | 2 <sup>nd</sup> | Processing of plastics.  |
|                  | 3 <sup>rd</sup> | Moulding processes: Injection moulding,  |
|                  | 4 <sup>th</sup> | Compression moulding, Transfer moulding  |
| 5 <sup>th</sup>  | 1 <sup>st</sup> | Extruding; Casting; Calendering.   |
|                  | 2 <sup>nd</sup> | Fabrication methods-Sheet forming, Blow moulding, Laminating plastics (sheets, rods & tubes), Reinforcing. |
|                  | 3 <sup>rd</sup> | Applications of Plastics.  |
|                  | 4 <sup>th</sup> | Topic end, Question answer discussion, Assignment 11   |
| 6 <sup>th</sup>  | 1 <sup>st</sup> | <b>Module 3 Additive Manufacturing Process</b><br>Introduction   |
|                  | 2 <sup>nd</sup> | Need for Additive Manufacturing  |
|                  | 3 <sup>rd</sup> | Fundamentals of Additive Manufacturing,  |
|                  | 4 <sup>th</sup> | AM Process Chain   |
| 7 <sup>th</sup>  | 1 <sup>st</sup> | Advantages and Limitations of AM,  |
|                  | 2 <sup>nd</sup> | Commonly used Terms, Classification of AM process,   |
|                  | 3 <sup>rd</sup> | Fundamental Automated Processes  |
|                  | 4 <sup>th</sup> | Distinction between AM and CNC,  |
| 8 <sup>th</sup>  | 1 <sup>st</sup> | Other related technologies.  |
|                  | 2 <sup>nd</sup> | Application –Application in Design, Aerospace Industry, Automotive Industry                                |
|                  | 3 <sup>rd</sup> | Application- Jewellery Industry, Arts and Architecture. RP Medical and Bioengineering Applications         |
|                  | 4 <sup>th</sup> | Web Based Rapid Prototyping Systems.   |
| 9 <sup>th</sup>  | 1 <sup>st</sup> | Concept of Flexible manufacturing process  |
|                  | 2 <sup>nd</sup> | Concurrent engineering   |
|                  | 3 <sup>rd</sup> | production tools like capstan and turret lathes,   |
|                  | 4 <sup>th</sup> | Rapid prototyping processes  |
| 10 <sup>th</sup> | 1 <sup>st</sup> | Topic end, Question answer discussion, Assignment III  |
|                  | 2 <sup>nd</sup> | <b>Module4.Special Purpose Machines (SPM): Introduction</b>  |
|                  | 3 <sup>rd</sup> | Concept, General elements of SPM   |
|                  | 4 <sup>th</sup> | Productivity improvement by SPM,   |
| 11 <sup>th</sup> | 1 <sup>st</sup> | Productivity improvement by SPM,   |
|                  | 2 <sup>nd</sup> | Productivity improvement by SPM,   |
|                  | 3 <sup>rd</sup> | Principles of SPM design.  |
|                  | 4 <sup>th</sup> | Principles of SPM design.  |
| 12 <sup>th</sup> | 1 <sup>st</sup> | Revision for   |
|                  | 2 <sup>nd</sup> | <b>Module5.Maintenance of Machine Tools:</b>   |
|                  | 3 <sup>rd</sup> | Types of maintenance   |
|                  | 4 <sup>th</sup> | Types of maintenance   |
| 13 <sup>th</sup> | 1 <sup>st</sup> | Repair cycle analysis  |
|                  | 2 <sup>nd</sup> | Repair cycle analysis  |
|                  | 3 <sup>rd</sup> | Repair complexity  |

|                        |                 |   |
|------------------------|-----------------|---|
|                        | 4 <sup>th</sup> | Maintenance manual,                                 |
| <b>14<sup>th</sup></b> | 1 <sup>st</sup> | Maintenance records                                 |
|                        | 2 <sup>nd</sup> | Housekeeping  |
|                        | 3 <sup>rd</sup> | Introduction to Total Productive Maintenance (TPM). |
|                        | 4 <sup>th</sup> | Total Productive Maintenance (TPM).                 |
| <b>15<sup>th</sup></b> | 1 <sup>st</sup> | Revision  |
|                        | 2 <sup>nd</sup> | Revision  |
|                        | 3 <sup>rd</sup> | Revision  |
|                        | 4 <sup>th</sup> | Revision  |



# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## Department of Mechanical Engineering

### LESSON PLAN

|  |                               |                                 |                        |
|--|-------------------------------|---------------------------------|------------------------|
| <b>Subject: Automobile Engineering and Hybrid Vehicles</b> |                               |                                 |                        |
| <b>Branch</b>  | <b>Mechanical Engineering</b> | <b>Name of the Faculty</b>      | <b>T Ganesh Achary</b> |
| <b>Course Code</b>   | <b>TH 2</b>                   | <b>Semester</b>                 | <b>6th Semester</b>    |
| <b>Total Periods</b>                                       | <b>60</b>                     | <b>Examination</b>              | <b>2023</b>            |
| <b>Theory Period</b>                                       | <b>4P/ W</b>                  | <b>Class Test</b>               | <b>20 Marks</b>        |
| <b>Maximum Marks</b>                                       | <b>100 Marks</b>              | <b>End Semester Examination</b> | <b>80 Marks</b>        |

| Week | Class Day       | Theory Topics   |
|------|-----------------|---|
| 1st  | 1st             | Auto mobiles: Definition ,need and classification                 |
|      | 2nd             | Layout of auto mobile chassis with major components(Line diagram) |
|      | 3rd             | Clutch System :Need, Types (Single & Multiple)                    |
|      | 4th             | Working principle with sketch: Different types of clutces         |
| 2nd  | 1st             | Gear Box: Purpose of gear box ,Types                              |
|      | 2nd             | Construction and working of a 4speed gear box                     |
|      | 3rd             | Concept of auto matic gear chang ng mechanisms                    |
|      | 4th             | Propeller shaft: Constructional features and working              |
| 3rd  | 1st             | Differential: Need ,Types and Working principle                   |
|      | 2nd             | Working of differential of 4-wheeler                              |
|      | 3rd             | Review class  |
|      | 4th             | Assignment Evaluation & Class Test                                |
| 4th  | 1 <sup>st</sup> | Braking systems in auto mobiles: Need and types                   |



|     |     |   |
|-----|-----|---|
|     | 2nd | Mechanical Brakes   |
|     | 3rd | Hydraulic Brake   |
|     | 4th | Air Brake and Vacuum Brake  |
| 5th | 1st | Air assisted Hydraulic Brake  |
|     | 2nd | Review class  |
|     | 3rd | Assignment Evaluation & Class Test  |
|     | 4th | Battery ignition system: Schematic diagram, elements and working          |
| 6th | 1st | Magnet ignition system: Schematic diagram, elements and working           |
|     | 2nd | Spark plugs: Purpose ,construction and specifications                     |
|     | 3rd | Common ignition troubles and its remedies                                 |
|     | 4th | Conventional suspension system for Rear and Front axle                    |
| 7th | 1st | Independent suspension system used in cars (coil spring and tension bars) |
|     | 2nd | Constructional features and working of a telescopic shock absorber        |
|     | 3rd | Review class  |
|     | 4th | Assignment Evaluation & Class Test  |
| 8th | 1st | Engine cooling: Need and classification                                   |
|     | 2nd | Cooling systems of IC engine  |
|     | 3rd | Defects of cooling and their remedial measures                            |
|     | 4th | Engine lubrication: Need and classification                               |
| 9th | 1st | Describe the Lubrication System of I.C. engine                            |
|     | 2nd | Review class  |
|     | 3rd | Assignment Evaluation & Class Test  |
|     | 4th | Fuels for Auto mobiles ,Fuel Properties                                   |

|      |                 |  |
|------|-----------------|--|
| 10th | 1 <sup>st</sup> | Air fuel ratio, Carburetor   |
|      | 2 <sup>nd</sup> | Carburetion process for Petrol Engine                                |
|      | 3 <sup>rd</sup> | Multipoint fuel injection system for Petrol Engine                   |
|      | 4 <sup>th</sup> | Air fuel ratio of diesel engine. Filter for Diesel engine            |
| 11th | 1 <sup>st</sup> | Elements of fuel injection system of Diesel engine                   |
|      | 2 <sup>nd</sup> | Working principle of fuel injection system for multi cylinder Engine |
|      | 3 <sup>rd</sup> | Principle of Fuel feed pump and Fuel Injector for Diesel engine      |
|      | 4 <sup>th</sup> | Review class   |
| 12th | 1 <sup>st</sup> | <i>Assignment Evaluation &amp; Class Test</i>                        |
|      | 2 <sup>nd</sup> | Introduction to Electric and Hybrid vehicles                         |
|      | 3 <sup>rd</sup> | Social and Environmental importance of Hybrid and Electric Vehicles  |
|      | 4 <sup>th</sup> | Description of Electric Vehicles, operational advantages             |
| 13th | 1 <sup>st</sup> | Present performance and applications of Electric Vehicles            |
|      | 2 <sup>nd</sup> | Battery for Electric Vehicles, Battery types and fuel cells          |
|      | 3 <sup>rd</sup> | Hybrid vehicles, Types of Hybrid and Electric Vehicles               |
|      | 4 <sup>th</sup> | Parallel, Series, Parallel and Series configurations                 |
| 14th | 1 <sup>st</sup> | Drivetrain   |
|      | 2 <sup>nd</sup> | Solar power generation and its application for automobiles           |
|      | 3 <sup>rd</sup> | Solar powered vehicles   |
|      | 5 <sup>th</sup> | Review class   |
| 15th | 1 <sup>st</sup> | <i>Assignment Evaluation &amp; Class Test</i>                        |
|      | 2 <sup>nd</sup> | <i>Discussion of previous year Question papers</i>                   |
|      | 3 <sup>rd</sup> | <i>Discussion of previous year Question papers</i>                   |
|      | 4 <sup>th</sup> | <i>Discussion of Possible Questions</i>                              |



# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## Department of Mechanical Engineering

### LESSON PLAN

|               |                            |                          |                          |
|---------------|----------------------------|--------------------------|--------------------------|
| Subject       | Design of Machine Elements |                          |                          |
| Branch        | Mechanical Engineering     | Name of the Faculty      | T Ganesh Achary          |
| Course Code   | Th 2                       | Semester                 | 5 <sup>th</sup> Semester |
| Total Periods | 60                         | Examination              | 2023                     |
| Theory Period | 4P/ W                      | Class Test               | 20 Marks                 |
| Maximum Marks | 100 Marks                  | End Semester Examination | 80 Marks                 |

| Week            | Class Day       | Theory Topics  |
|-----------------|-----------------|--|
| 1 <sup>st</sup> | 1 <sup>st</sup> | Introduction about Machine Design and classification, types of load                                |
|                 | 2 <sup>nd</sup> | Factors governing the design of machine elements. Design procedure                                 |
|                 | 3 <sup>rd</sup> | Mechanical properties of the material of the product.  |
|                 | 4 <sup>th</sup> | Types of loads. Working stress, Yield stress, Ultimate Stress & Factor of safety. Fatigue & Creep. |
| 2 <sup>nd</sup> | 1 <sup>st</sup> | Review Class   |
|                 | 2 <sup>nd</sup> | Assignment Evaluation & Class Test   |
|                 | 3 <sup>rd</sup> | Method of riveting, Types of riveted joints  |
|                 | 4 <sup>th</sup> | Failures of riveted joints, Strength & efficiency of riveted joints.                               |
| 3 <sup>rd</sup> | 1 <sup>st</sup> | Classroom Problem  |
|                 | 2 <sup>nd</sup> | Classroom Problem  |
|                 | 3 <sup>rd</sup> | Classroom Problem  |
|                 | 4 <sup>th</sup> | Review Class   |
| 4 <sup>th</sup> | 1 <sup>st</sup> | Types of welded joints. Advantages of welded joints over other joints.                             |
|                 | 2 <sup>nd</sup> | Strength of welded joints for eccentric loads.   |
|                 | 3 <sup>rd</sup> | Classroom Problem  |
|                 | 4 <sup>th</sup> | Classroom Problem  |

|                  |                 |   |
|------------------|-----------------|---|
| 5 <sup>th</sup>  | 1 <sup>st</sup> | ClassroomProblem  |
|                  | 2 <sup>nd</sup> | ReviewClass   |
|                  | 3 <sup>rd</sup> | Nomenclatures,formofthreads&specifications.   |
|                  | 4 <sup>th</sup> | Designofscrewthread(nutand bolt).   |
| 6 <sup>th</sup>  | 1 <sup>st</sup> | ClassroomProblem  |
|                  | 2 <sup>nd</sup> | ClassroomProblem  |
|                  | 3 <sup>rd</sup> | ReviewClass   |
|                  | 4 <sup>th</sup> | AssignmentEvaluation&ClassTest  |
| 7 <sup>th</sup>  | 1 <sup>st</sup> | Functionofshafts.Materialsforshafts.Standardsize of shaft as per I.S.   |
|                  | 2 <sup>nd</sup> | Designsolid&hollowshaftstotransmitagivenpoweratgivenrpm based on (a) Strength (Shear stress, Combined bending &tension)                                   |
|                  | 3 <sup>rd</sup> | ClassroomProblem  |
|                  | 4 <sup>th</sup> | ClassroomProblem  |
| 8 <sup>th</sup>  | 1 <sup>st</sup> | Designsolid&hollowshaftstotransmitagivenpoweratgivenrpm based on (b) Rigidity (Angle of twist, Deflection,modulusofrigidity)                              |
|                  | 2 <sup>nd</sup> | ClassroomProblem  |
|                  | 3 <sup>rd</sup> | ClassroomProblem  |
|                  | 4 <sup>th</sup> | ReviewClass   |
| 9 <sup>th</sup>  | 1 <sup>st</sup> | AssignmentEvaluation&ClassTest  |
|                  | 2 <sup>nd</sup> | Functionofkeys,typesofkeys&materialofkeys.Failureof key, effect of key way.   |
|                  | 3 <sup>rd</sup> | Designrectangularsunkkeyconsideringitsfailureagainstshear & crushing. Design rectangular sunk key byusing empirical relation for given diameter of shaft. |
|                  | 4 <sup>th</sup> | Specificationofparallelkey,Gib-headkey,taperkeyasperI.S.  |
| 10 <sup>th</sup> | 1 <sup>st</sup> | ClassroomProblem  |
|                  | 2 <sup>nd</sup> | ClassroomProblem  |
|                  | 3 <sup>rd</sup> | ClassroomProblem  |
|                  | 4 <sup>th</sup> | ReviewClass   |
| 11 <sup>th</sup> | 1 <sup>st</sup> | QuizTest  |
|                  | 2 <sup>nd</sup> | DesignofShaftCoupling   |
|                  | 3 <sup>rd</sup> | Requirementsofagoodshaftcoupling,Typesof Coupling   |
|                  | 4 <sup>th</sup> | DesignofSleeveorMuff-Coupling.  |
| 12 <sup>th</sup> | 1 <sup>st</sup> | ClassroomProblem  |
|                  | 2 <sup>nd</sup> | ClassroomProblem  |
|                  | 3 <sup>rd</sup> | DesignofClamporCompressionCoupling.   |
|                  | 4 <sup>th</sup> | ClassroomProblem  |
| 13 <sup>th</sup> | 1 <sup>st</sup> | ClassroomProblem  |
|                  | 2 <sup>nd</sup> | Reviewclass   |

|             |            |  |
|-------------|------------|--|
|             | <b>3rd</b> | AssignmentEvaluation&ClassTest   |
|             | <b>4th</b> | Materialsusedforhelicalspring.Standardsizespringwire.(SWG),<br>Terms used in compression spring.     |
| <b>14th</b> | <b>1st</b> | Stressinhelicalspringofacircularwire.Endconnectionforhelical<br>tensionspring.                       |
|             | <b>2nd</b> | Endconnectionforhelicaltensionspring.Deflectionofhelical<br>spring of circular wire. Surge in spring |
|             | <b>3rd</b> | ClassroomProblem   |
|             | <b>4th</b> | ClassroomProblem   |
| <b>15th</b> | <b>1st</b> | Reviewclass  |
|             | <b>2nd</b> | AssignmentEvaluation&ClassTest   |
|             | <b>3rd</b> | DiscussionofpreviousyearQuestions  |
|             | <b>4th</b> | DiscussionofpreviousyearQuestions  |



**GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING**  
**Department of Mechanical Engineering**

**LESSON PLAN**

|                      |                               |                                 |                        |
|----------------------|-------------------------------|---------------------------------|------------------------|
| <b>Subject</b>       | <b>Fluid Mechanics</b>        |                                 |                        |
| <b>Branch</b>        | <b>Mechanical Engineering</b> | <b>Name of the Faculty</b>      | <b>K Trinath Patro</b> |
| <b>Course Code</b>   | <b>Th-3</b>                   | <b>Semester</b>                 | <b>4th Semester</b>    |
| <b>Total Periods</b> | <b>60</b>                     | <b>Examination</b>              | <b>2023</b>            |
| <b>Theory Period</b> | <b>4P/ W</b>                  | <b>Class Test</b>               | <b>20 Marks</b>        |
| <b>Maximum Marks</b> | <b>100 Marks</b>              | <b>End Semester Examination</b> | <b>80 Marks</b>        |

| <b>Week</b> | <b>Class Day</b> | <b>Theory/Practical Topics</b>   |
|-------------|------------------|--|
| 1st         | 1st              | <b>Properties of fluid:</b><br>Definition and units of fluid properties like density, specific weight, specific volume and specific gravity. |
|             | 2nd              | Numerical  |
|             | 3rd              | Definition and units of fluid properties such as viscosity, kinematic viscosity.   |
|             | 4th              | surface tension and capillarity  |
| 2nd         | 1st              | <b>Fluid pressure and its measurements</b><br>Definitions and units of fluid pressure, pressure intensity and pressure head. Pascal's Law.   |
|             | 2nd              | Concepts of atmospheric, gauge, vacuum and absolute pressure.  |
|             | 3rd              | Pressure Measuring instruments: Manometers (simple, differential and piezometers),   |
|             | 4th              | Numerical  |
| 3rd         | 1st              | Numerical  |
|             | 2nd              | Mechanical Gauges (Bourdon's tube pressure gauge)  |
|             | 3rd              | <i>Doubt clearing Class</i>  |
|             | 4th              | <i>Assignment Evaluation / Class Test</i>  |
| 4th         | 1st              | <b>Hydrostatics</b><br>Definition of hydrostatic pressure, total pressure and centre of pressure.  |

|      |     |   |
|------|-----|---|
|      | 2nd | Total pressure and centre of pressure of immersed horizontal bodies           |
|      | 3rd | Total pressure and centre of pressure of immersed vertical bodies             |
|      | 4th | Numerical   |
| 5th  | 1st | Concept of flotation, buoyancy, centre of buoyancy, Archimedes principle      |
|      | 2nd | Metacentre and metacentric height   |
|      | 3rd | Numerical   |
|      | 4th | <i>Doubt clearing Class</i>   |
| 6th  | 1st | <i>Quiz Test</i>  |
|      | 2nd | <b>Kinematics of Flow</b><br>Types of fluid flow                              |
|      | 3rd | Continuity equation (statement and proof), Numerical                          |
|      | 4th | Numerical   |
| 7th  | 1st | State and Prove Bernoulli's equation,   |
|      | 2nd | Limitations of Bernoulli's theorem  |
|      | 3rd | Numerical   |
|      | 4th | Practical applications of Bernoulli's equation: Venturi meter and Pitot tube. |
| 8th  | 1st | Numerical   |
|      | 2nd | <i>Doubt Clearing class</i>   |
|      | 3rd | <i>Assignment Evaluation / Class Test</i>                                     |
|      | 4th | <b>Orifices, notches &amp; weirs</b><br>Definition of Orifice, Types          |
| 9th  | 1st | Orifice co-efficient and relation among them.                                 |
|      | 2nd | Definition of notch and weir,<br>Classifications of notches & weirs           |
|      | 3rd | Discharge over a rectangular notch or weir.                                   |
|      | 4th | Discharge over a triangular notch or weir                                     |
| 10th | 1st | Numerical   |
|      | 2nd | Numerical   |
|      | 3rd | <i>Doubt Clearing Class</i>   |
|      | 4th | <b>Flow through pipe:</b><br>Darcy-Weisbach formula, Numerical                |
| 11th | 1st | Chezy's formula for loss of head due to friction in pipes. Numerical          |
|      | 2nd | Pipe losses, Hydraulic Gradient, Total Energy Line.                           |
|      | 3rd | Numerical   |
|      | 4th | <i>Doubt Clearing Class</i>   |

|      |     |   |
|------|-----|---|
| 12th | 1st | <i>Assignment Evaluation / Class Test</i>   |
|      | 2nd | <b>Impact of jets</b><br>Force exerted by the Impact of jet on a stationary vertical plate                        |
|      | 3rd | Numerical   |
|      | 4th | Force exerted by a jet on a moving Vertical flat plate,   |
| 13th | 1st | Numerical   |
|      | 2nd | Derivation of work done on series of vanes and condition for maximum efficiency.                                  |
|      | 3rd | Numerical   |
|      | 4th | Impact of jet on moving curved vanes, illustration using velocity triangles, derivation of work done, efficiency. |
| 14th | 1st | Numerical   |
|      | 2nd | <i>Assignment Evaluation / Class Test</i>   |
|      | 3rd | <i>Doubt Clearing Class</i>   |
|      | 4th | <i>Practice test</i>  |
| 15th | 1st | <i>Practice test</i>  |
|      | 2nd | <i>Revision</i>   |
|      | 3rd | <i>Revision</i>   |
|      | 4th | <i>Discussion of previous year questions</i>  |





# GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

## Department of Mechanical Engineering

### LESSON PLAN

|                      |                               |                                 |                        |
|----------------------|-------------------------------|---------------------------------|------------------------|
| <b>Subject</b>       | <b>Theory of Machine</b>      |                                 |                        |
| <b>Branch</b>        | <b>Mechanical Engineering</b> | <b>Name of the Faculty</b>      | <b>T Ganesh Achary</b> |
| <b>Course Code</b>   | <b>Th-1</b>                   | <b>Semester</b>                 | <b>4th Semester</b>    |
| <b>Total Periods</b> | <b>60</b>                     | <b>Examination</b>              | <b>2023</b>            |
| <b>Theory Period</b> | <b>4P/ W</b>                  | <b>Class Test</b>               | <b>20 Marks</b>        |
| <b>Maximum Marks</b> | <b>100 Marks</b>              | <b>End Semester Examination</b> | <b>80 Marks</b>        |

| Week | Class Day | Theory Topics   |
|------|-----------|---|
| 1st  | 1st       | Link and types of link, Pair and types of pair, lower pair & higher pair.   |
|      | 2nd       | Joints and types of joints. Relation between link, joint and pair. Degrees of freedom. Kinematic Chain.   |
|      | 3rd       | Mechanism, Machine, Structure, Difference between machine and structure.  |
|      | 4th       | Four bar chain mechanism and its inversion  |
| 2nd  | 1st       | Slider crank chain mechanism and its inversion  |
|      | 2nd       | Cam and Follower  |
|      | 3rd       | Review class  |
|      | 4th       | <i>Assignment Evaluation &amp; Class Test</i>   |
| 3rd  | 1st       | Revision on friction (Force of friction, coefficient of friction, limiting friction, angle of friction, angle of repose, friction on horizontal plane and inclined plane) |
|      | 2nd       | Screw Jack: Terminology, Friction between nut and screw for screw jack. Torque required to raise or lower the load  |
|      | 3rd       | Efficiency of screw jack. Numerical   |
|      | 4th       | Bearing: Function of bearing, Classification, Ball, roller and needle roller bearing  |
| 4th  | 1st       | Torque transmission in flat collar bearing, Simple Problems   |
|      | 2nd       | Torque transmission in flat pivot bearing, Simple Problems  |
|      | 3rd       | Torque transmission in conical pivot bearing, Numerical   |
|      | 4th       | Clutch, Classification, Single and multiple clutch, Working of single plate clutch  |

|      |     |  |
|------|-----|--|
| 5th  | 1st | Torque transmission in Single and multiple clutch, Simple Problems   |
|      | 2nd | Working of simple frictional brakes  |
|      | 3rd | Working of absorption type dynamometer   |
|      | 4th | Review class   |
| 6th  | 1st | <i>Assignment Evaluation &amp; Class Test</i>  |
|      | 2nd | Concept of power transmission, types of drives – belt, chain, rope and gear drives.  |
|      | 3rd | Types of belt drive, Pulley and types of pulley  |
|      | 4th | Velocity ratio of belt drive, Length of open and crossed belt drive  |
| 7th  | 1st | Numerical Discussion   |
|      | 2nd | Ratio of tension, Power transmission in belt, Numerical  |
|      | 3rd | Initial tension in belt, Centrifugal tension, Determination of belt thickness and width for given permissible stress for open and crossed belt considering centrifugal tension |
|      | 4th | Numerical Discussion   |
| 8th  | 1st | V-belt and V-belt pulley, Crowning of pulley, Gear drives and its  |
|      | 2nd | Working principle of simple, compound gear trains  |
|      | 3rd | Working principle of reverted and epicyclic gear trains  |
|      | 4th | Review class   |
| 9th  | 1st | <i>Assignment Evaluation &amp; Class Test</i>  |
|      | 2nd | Function of governor, Classification of governor, Working of centrifugal governor  |
|      | 3rd | Working of Watt and Porter Governor  |
|      | 4th | Working of Proell and Hartnell governor  |
| 10th | 1st | Sensitiveness and Stability of governor, isochronous governor  |
|      | 2nd | Numerical Discussion   |
|      | 3rd | Flywheel: Function of flywheel, difference between flywheel and governor   |
|      | 4th | Fluctuation of energy, coefficient of fluctuation of energy, coefficient of fluctuation of speed   |
| 11th | 1st | Numerical Discussion   |
|      | 2nd | Review class   |
|      | 3rd | <i>Assignment Evaluation &amp; Class Test</i>  |
|      | 4th | Concept of static and dynamic balancing  |
| 12th | 1st | Principle of Balancing of reciprocating masses   |
|      | 2nd | Static Balancing of rotating masses  |

|      |     |   |
|------|-----|---|
|      | 3rd | Static Balancing of rotating masses: Continue                                       |
|      | 4th | Causes and effects of unbalance   |
| 13th | 1st | Numerical Discussion  |
|      | 2nd | Review class  |
|      | 3rd | <i>Assignment Evaluation &amp; Class Test</i>                                       |
|      | 4th | Introduction to vibration and the terms Amplitude, time period, frequency and cycle |
| 14th | 1st | Classification of vibration, Concept of natural, forced and damped vibration        |
|      | 2nd | Longitudinal and Transverse vibration   |
|      | 3rd | Torsional Vibration   |
|      | 4th | Causes and remedies of vibration  |
| 15th | 1st | Review class  |
|      | 2nd | <i>Assignment Evaluation &amp; Class Test</i>                                       |
|      | 3rd | <i>Discussion on Previous year question paper</i>                                   |
|      | 4th | <i>Discussion on Previous year question paper</i>                                   |
| 14th | 1st | Classification of vibration, Concept of natural, forced and damped vibration        |
|      | 2nd | Longitudinal and Transverse vibration   |
|      | 3rd | Torsional Vibration   |
|      | 4th | Causes and remedies of vibration  |
| 15th | 1st | Review class  |
|      | 2nd | <i>Assignment Evaluation &amp; Class Test</i>                                       |
|      | 3rd | <i>Discussion on Previous year question paper</i>                                   |
|      | 4th | <i>Discussion on Previous year question paper</i>                                   |