

## Lesson Plan

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| Name of Institute          | : Ambala College of Engineering and Applied Research |
| Name of the Faculty member | : Er. Ajay Kumar                                     |
| Discipline                 | : Mechanical Engineering                             |
| Semester                   | : 4 <sup>th</sup>                                    |
| Subject                    | : Applied Thermodynamics                             |
| Lesson Plan Duration       | : 15 weeks (from January 2020 to April 2020)         |
| Work Load                  | : L-3 T-1  |

| Week            | Theory          |   |
|-----------------|-----------------|---|
|                 | Lecture day     | Topic (including assignment/ test)  |
| 1 <sup>st</sup> | 1 <sup>st</sup> | Introduction; classification of boilers; comparison of fire tube and water tube boiler; their advantages;       |
|                 | 2 <sup>nd</sup> | Description of boiler; Lancashire; locomotive   |
|                 | 3 <sup>rd</sup> | Description of boiler Babcock and Wilcox  |
|                 | <b>Tutorial</b> | Revision of discussed Topics  |
| 2 <sup>nd</sup> | 1 <sup>st</sup> | Boiler mountings; stop valve; safety valve; blow off valve; feed check etc                                      |
|                 | 2 <sup>nd</sup> | Boiler mountings; water level indicator; fusible plug; pressure gauge   |
|                 | 3 <sup>rd</sup> | Boiler accessories; feed pump; feed water heater;.  |
|                 | <b>Tutorial</b> | Class Test on Boiler Mountings  |
| 3 <sup>rd</sup> | 1 <sup>st</sup> | Boiler accessories; Air preheater; super heater; economizer;  |
|                 | 2 <sup>nd</sup> | Natural draught chimney design  |
|                 | 3 <sup>rd</sup> | artificial draught; stream jet draught; mechanical draught  |
|                 | <b>Tutorial</b> | Revision of discussed Topics  |
| 4 <sup>th</sup> | 1 <sup>st</sup> | Calculation of boiler efficiency and equivalent evaporation   |
|                 | 2 <sup>nd</sup> | Carnot cycle with Numerical problem   |
|                 | 3 <sup>rd</sup> | Simple Rankine cycle with Numerical problem   |
|                 | <b>Tutorial</b> | Numerical Problems & Assignment -1  |
| 5 <sup>th</sup> | 1 <sup>st</sup> | Modified Rankine cycle with Numerical problem   |
|                 | 2 <sup>nd</sup> | Effect of operating parameters on rankine cycle performance; effect of superheating; effect of maximum pressure |
|                 | 3 <sup>rd</sup> | Effect of exhaust pressure; reheating   |
|                 | <b>Tutorial</b> | Class Test – 1 ( Syllabus will be notified )  |
| 6 <sup>th</sup> | 1 <sup>st</sup> | Regenerative Rankine cycle  |
|                 | 2 <sup>nd</sup> | Numerical Problems related to regenerative rankine cycle  |
|                 | 3 <sup>rd</sup> | Types of feed water heater; reheat factor   |
|                 | <b>Tutorial</b> | Numerical Problems  |
| 7 <sup>th</sup> | 1 <sup>st</sup> | Binary vapour cycle.  |
|                 | 2 <sup>nd</sup> | Simple steam engine and its various component   |
|                 | 3 <sup>rd</sup> | Compound steam engine and its various component   |
|                 | <b>Tutorial</b> | Numerical Problems  |
| 8 <sup>th</sup> | 1 <sup>st</sup> | Function of steam nozzle; shape of nozzle for subsonics and supersonics flow of stream;                         |
|                 | 2 <sup>nd</sup> | Variation of velocity; area of specific volume; steady state energy equation; continuity equation               |

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|                  | 3 <sup>rd</sup> | Nozzle efficiency; critical pressure ratio for maximum discharge; physical explanation of critical pressure; |
|                  | <b>Tutorial</b> | Numerical Problems & Assignment -2   |
| 9 <sup>th</sup>  | 1 <sup>st</sup> | Numerical problems on steam nozzle   |
|                  | 2 <sup>nd</sup> | Super saturated flow of steam; design of steam nozzle. Advantage of steam condensation                       |
|                  | 3 <sup>rd</sup> | Numerical problems on design of nozzle   |
|                  | <b>Tutorial</b> | Numerical Problems   |
| 10 <sup>th</sup> | 1 <sup>st</sup> | Numerical problems on steam nozzle   |
|                  | 2 <sup>nd</sup> | Super saturated flow of steam; design of steam nozzle. Advantage of steam condensation                       |
|                  | 3 <sup>rd</sup> | Numerical problems on design of nozzle   |
|                  | <b>Tutorial</b> | Class Test – 1 ( Syllabus will be notified )   |
| 11 <sup>th</sup> | 1 <sup>st</sup> | Introduction; classification of steam turbine  |
|                  | 2 <sup>nd</sup> | Impulse turbine; working principal;; velocity diagram;   |
|                  | 3 <sup>rd</sup> | Compounding of impulse turbine   |
|                  | <b>Tutorial</b> | Numerical Problems   |
| 12 <sup>th</sup> | 1 <sup>st</sup> | Calculation of power output of a single stage impulse turbine  |
|                  | 2 <sup>nd</sup> | Calculation of efficiency; maximum efficiency of a single stage impulse turbine                              |
|                  | 3 <sup>rd</sup> | Numerical problem on output and efficiency of impulse turbine  |
|                  | <b>Tutorial</b> | Numerical Problems & Assignment -3   |
| 13 <sup>th</sup> | 1 <sup>st</sup> | Design of impulse turbine blade section  |
|                  | 2 <sup>nd</sup> | Impulse reaction turbine; working principle  |
|                  | 3 <sup>rd</sup> | Degree of reaction   |
|                  | <b>Tutorial</b> | Numerical Problems   |
| 14 <sup>th</sup> | 1 <sup>st</sup> | Numerical on impulse reaction turbine  |
|                  | 2 <sup>nd</sup> | Parsons turbine; velocity diagram  |
|                  | 3 <sup>rd</sup> | Calculation of power output;   |
|                  | <b>Tutorial</b> | Numerical Problems   |
| 15 <sup>th</sup> | 1 <sup>st</sup> | Efficiency of blade height   |
|                  | 2 <sup>nd</sup> | Numerical on power output, maximum efficiency  |
|                  | 3 <sup>rd</sup> | Internal losses in steam turbine; governing of steam turbine.  |
|                  | <b>Tutorial</b> | Numerical Problems & Assignment -4   |

(Signature of the teacher concerned with date)