**Lesson Plan**

Name of the Faculty : Mr. Sandeep Chhillar (Theory & Practical)

Discipline : Mechanical Engineering

Semester : 6th

Subject : Internal Combustion Engine and Gas Turbine (PEC-ME-320G)

Lesson Plan Duration : 15 Weeks

\*\* Work Load (Lecture/Practical) per week (in hours): Lectures-03, Practicals-01

|  |  |  |
| --- | --- | --- |
| **Week** | **Theory** | **Practical** |
| **Lecture Day** | **Topic****(including assignment/test)** | **Practical day** | **Topic** |
| 1st | 1st  | **Air Standard Cycles:** Internal and external combustion engines; | 1st | To study the constructional details & working principles of two-strokePetrol/ four-stroke petrol Engine. |
| 2nd | classification of I.C. Engines, Cycles of operation in four stroke and two stroke I.C. Engines |
| 3rd | Wankel Engines, Assumptions made in air standard cycle;  |
| 2nd | 4th | Otto cycle; diesel cycle, dual combustion cycle | 2nd  | To study the constructional details & working principles of two-strokeDiesel / four-stroke Diesel Engine. |
| 5th  | comparison of Otto, diesel and dual combustion cycles |
| 6th | sterling and Ericsson cycles; air standard efficiency |
| 3rd  | 7th  | specific work output, specific weight; work ratio | 3rd  | To prepare variable speed performance test of a multi-cylinder/single-cylinder petrol engine / diesel engine and prepare the curve (i)bhp, ihp, fhp Vs Speed (ii) Volumetric efficiency & indicatedSpecific fuel consumption Vs Speed. |
| 8th  | mean effective pressure; deviation of actual engine cycle from ideal cycle, numerical Problems |
| 9th | **Accessories:** Carburetion, fuel Injection and Ignition systems: |
| 4th | 11th | Mixture requirements for various operating conditions in S.I.Engines elementary carburetor, | 4th  | To perform constant speed performance test on a single-cylinder/multi-cylinder diesel engine & draw curves of (i) bhp Vs fuel rate, airrate and A/F and (ii) bhp Vs mep, mechanical efficiency & s.f.c. |
| 12th | Requirements of a diesel injection system; types of inject systems |
| 13th | Petrol injection, Requirements of timing; spark plugs |
| 5th | 14th | Numerical problems and Assignment | 5th | To study and determine the effect of A/F ratio on the performance ofthe two stroke, single – cylinder petrol engine |
| 15th | **Combustion in I.C. Engines:** I. engines; Ignition limits; stages of combustion in Engines |
| 16th | S.I. Engines; Ignition lag |
| 6th | 17th | velocity of flame propagation; detonation; effects of engine | 6th | To study and draw the valve timing diagram four stroke, single –Cylinder diesel engine. |
| 18th | variables on detonation; theories of detonation; octane rating of fuels |
| 19th | Pre-ignition; S.I. engine combustion chambers, Stages of combustion in C.I. Engines |
| 7th  | 20th | delay period; variables affecting delay period | 7th  | To draw the scavenging characteristic curves of single cylinderpetrol engine |
| 21st |  knock in C.I. engines, Cetane rating |
| 22nd |  C.I. engine combustion chambers |
| 8th | 23rd | **Lubrication & Cooling System:**  Functions of a lubricating system | 8th | . To find intensity of smoke from a single cylinder / multi-cylinder diesel engine. |
| 24th  | Types of lubrication system; mist, wet sump and dry sump systems |
| 25th  | properties of lubricating oil; SAE rating of lubricants,  |
| 9th  | 26th  | engine performance and lubrication | 9th  | To measure CO & Hydrocarbons in the exhaust of 2- stroke / 4-stroke petrol engine. |
| 27th | Necessity of engine cooling; disadvantages of overcooling |
| 28th | cooling systems; air-cooling, water cooling; radiators and Assignment |
| 10th  | 29th  | **Engine Testing & Performance:** Performance parameters: BHP, IHP, mechanical efficiency |  |  |
| 30th | brake mean effective pressure and indicative mean effective pressure |  |  |
| 31st | torque, volumetric efficiency;  |  |  |
| 11th | 32nd | specific fuel consumption (BSFC, ISFC) |  |  |
| 33rd | thermal efficiency; heat balance; Basic engine measurements |  |  |
| 34th | fuel and air consumption, brake power,  |  | . |
| 12th  | 35th | indicated power and friction power |  |  |
| 36th | Heat lost to coolant and exhaust gases; performance curves. Problems |  |  |
| 37th | **Air pollution from I.C. Engine and its remedies:** Pollutants from S.I. and C.I. Engines |  |  |
|  13th  | 38th | Methods of emission control; alternative fuels for I.C. Engines, |  |  |
| 39th | the current scenario on the pollution from Engine |  |  |
| 40th | **Rotary Compressors:**  Root and vane blowers; Static and total head values |  |  |
| 14th  | 41st | Centrifugal compressors- Velocity diagrams, slip factor,  |  |  |
| 42nd | ratio of compression, pressure coefficient, pre-whirl |  |  |
| 43rd  | Axial flow compressor- Degree of reaction, polytrophic efficiency |  |  |
| 15th | 44th | Surging, choking and stalling, performance characteristics, Problems. |  |  |
| 45th | **Gas Turbines:** Brayton cycle; Components of a gas turbine plant |  |  |
| 46th  | open and closed types of gas turbine plants, Optimum pressure ratio |  |  |
| 16th  | 47th  | Improvements of the basic gas turbine cycle;  |  |  |
| 48th  | multi stage compression with inter-cooling |  |  |
| 49th  | multi stage expansion with reheating between stages |  |  |
| 17th  | 50th  | exhaust gas heat exchanger, Applications of gas turbines |  |  |