

RamgarhiaPolytechnicCollege,Phagwara



MechanicalEngineeringDepartment

Head of Department:	Er. Gaurav Kumar
Name of the Faculty:	Er. Jaspreet Singh Sekhon
Discipline:	Mechanical Engineering Department
Semester:	5 th
Subject:	Thermodynamics-II
Lesson Plan Duration:	16Weeks

RATIONALE

A diploma holder in this course is supposed to know about testing of IC Engines, fuel supply, ignition system, cooling and lubrication of engines and gas turbines. Hence this subject.

Learning Outcomes

After undergoing this course, the students will be able to:

- CO1. Explain the working of IC engine. Draw and interpret various refrigeration cycles.

- CO2. Diagnose and rectify simple problems in fuel supply and ignition system.
- CO3. Explain the functioning of different components of fuel supply of diesel engine.
- CO4. Explain the working of lubrication and cooling system in IC engine.
- CO5. Assisintestingan IC engine.
- CO6. Explain the functioning of steam turbine, gas turbine and jet propulsion.

PO \Rightarrow	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO \Downarrow							
CO1							
CO2							
CO3							
CO4							
CO5							
CO6							

Syllabus

Units	Details	Hours
1.	IC Engines Introduction Working principle of two stroke and four stroke cycle, SI engines and CI engines , Otto cycle, diesel cycle and dual cycle Location and functions of various parts of IC engines and materials used for them	(09hrs)
2.	Fuel Supply and Ignition System in Petrol Engine. Concept of carburetion Air fuel ratio Simple carburetor and its application, carburetor of two wheeler.	(08hrs)

	Description of battery coil and electro ignition system, fault finding/and remedial action in ignition system Description of petrol injection system	
3.	Fuel System of Diesel Engine Components of fuel system Description and working of fuel feed pump Fuel injection pump, Common rail direct injection(CRDI) Injectors	(06hrs)
4.	Cooling and Lubrication Function of cooling system in IC engine Aircoolingandwatercoolingsystem,useofthermostat,radiatorandforcedcirculationin water cooling(description with line diagram) Function of lubrication Types and properties of lubricant Lubrication system of engine Faultfinding in cooling and lubrication and remedial action	(10hrs)
5.	Testing of IC Engines Engine power-indicated and brake power Efficiency-mechanical, thermal. Relative and volumetric Methods of finding indicated and brake power Morsetestforpetro1engine Heat balance sheet, simple numerical problems ConceptofpollutantsinSIandCIengines,pollutioncontrol,normsfortwo or four wheelers- EURO-1, EURO-2,Bharatmethodsof reducingpollutioninICengines,alternativefuelslikeCNG,LPG,Hydrogen	(09hrs)
6.	Steam Turbines and Steam Condensers Function and use of steam turbine Steam nozzles-types and applications Steam turbines - impulse, reaction, simple and compound, construction and working principle Governing of steam turbines Function of a steam condenser, elements of condensing plant Classification-jet condenser, surface condenser Cooling pond and cooling towers	(10hrs)
7.	Gas Turbines and Jet Propulsion Classification, open cycle gas turbine and closed cycle gas turbine, comparison of gas turbines with reciprocating IC engines, applications and limitations of gas turbine Open cycle constant pressure gas turbines - general layout, PV and TS diagram and working of gas turbine Closed cycle gas turbines, PV and TS diagram and working Principle of operation of ram-jet engine and turbojet engine -	(12hrs)

	Application of jet engines Rocket engine-its principle of working and applications Fuels used in jet propulsion	
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Reference Books:

1. Elements of Heat Engines by Pandey and Shah; Charotar Publishing House, Anand..2.ThermalEngineeringbyPL.Ballaney;KhannaPublishers,New Delhi.
3. EngineeringThermodynamicsbyFrancisFHuang;McMillanPublishingCompany,Delhi.
4. EngineeringThermodynamicsbyCP.Arora;TataMcGrawHillPublishers,NewDelhi.
5. ThermalEngineeringbyRKPurohit;StandardPublishersDistributors,NewDelhi.

Delivery/Instructional Methodologies

Sr.No.	Description
1.	Chalk and Talk
2.	PowerPoint Presentation

Assessment Methodologies

Sr. No.	Description	Type
1.	Student Assignment	Direct
2.	Test	Direct
3.	Board Examination	Direct
4.	Student Feedback	Direct

Gaps in the syllabus-to meet industry/profession requirements

S.NO.	DESCRIPTION	PROPOSED ACTIONS	PO MAPPING
	N/A	N/A	N/A

Topics beyond syllabus/advanced topics

Units	Details	Hours
N/A	N/A	N/A

Web Source References

Sr.No.	URL
1.	https://nptel.ac.in/

Lesson Plan

Week	Theory		Practical	
	Lecture Day		Practical Day	02hrsperweek
1 st	1 st	Introduction	1.	Dismantle an IC engine and note down the condition of various parts, removal and fitting of piston, rings , measuring of bore size, crank shaft ovality and assemble it.
	2 nd	Working principle of two stroke and four stroke cycle		
	3 rd	SI engines and CI engines		
	4 th	Otto cycle		

2 nd	5 th	Diesel cycle	2.	Dismantle a carburetor
	6 th	Dual cycle		
	7 th	Location and functions of various parts of IC engines		
	8 th	Materials used for them		
9 th				
3 rd	10 th	Concept of carburetion	3.	Servicing of petrol injection system
	11 th	Air fuel ratio		
	12 th	Simple carburetor and its application, carburetor of two wheel.		
	13 th			
4 th	14 th	Description of battery coil and electro ignition system, fault finding/ and remedial action in ignition system	4.	Valve servicing, grinding, lapping and fitting mechanism and tappet adjustment
	15 th			
	16 th	Description of petrol injection system		
	17 th			
5 th	18 th	Components of fuel system	5.	Inspection of ignition system of a multi-cylinder engine stressing ignition timings, setting, fixing order and contact breaker; gap adjustment, spark plug cleaning
	19 th	.		
	20 th	Description and working of fuel feed pump		
	21 st	Fuel injection pump,		

6 th	22 nd	Common rail direct injection(CRDI)	6.	REVISION
	23 rd	REVISION		
	24 th	1st Sessional Test(Tentative)		
7 th	25 th	Injectors	7.	Service of cooling &lubrication system of IC engine and note down the functioning/testing of various components.
	26 th	Function of cooling system in IC engine		
	27 th	Air cooling and water cooling system, use of thermostat, radiator and forced circulation in water cooling (description with line diagram)		
	28 th			
8 th	29 th	Function of lubrication, Types and properties of lubricant	8.	Determination of BHP by dynamometer.
	30 th			
	31 st	Lubrication system of engine		
	32 nd			
9 th	33 rd	Fault finding in cooling and lubrication and remedial action	9.	Morse test on multi-cylinder petrol engine.
	34 th			
	35 th			
	36 th	Engine power-indicated and brake power		
	37 th	Efficiency-mechanical,		

10 th	38 th	thermal. Relative and volumetric Methods of finding indicated and brake power, Morse test for petrol engine	10.	Draw layout of modern automobile workshop and note down the special tools and equipments in each shop.
	39 th			
	40 th			
11 th	41 st	Heat balance sheet, simple numerical problems Concept of pollutants in SI and CI engines, pollution control, norms for two or four wheelers - EURO - 1,EURO-2, Bharat methods of reducing pollution in IC engines, alternative fuels like CNG, LPG, Hydrogen	11.	Local visit roadways or private automobile workshop.
	42 nd			
	43 rd			
	44 th			
12 th	45 th	PTM	12.	REVISION
	46 th	2nd Sessional Test(Tentative)		
	47 th	Function and use of steam turbine		
	48 th			
13 th	49 th	Steam nozzles - types and applications	13.	Local visit to roadways or private automobile workshop.
	50 th			
	51 st	Steam turbines -impulse,		

	52 nd	reaction, simple and compound, construction and working principle			
14 th	53 rd	Governing of steam turbines Function of a steam condenser, elements of condensing plant	14	Local visit to roadways or private automobile workshop.	
	54 th				
	55 th				
	56 th	Classification – jet condenser, surface condenser, Cooling pond and cooling towers			
15 th	57 th	Classification, open cycle gas turbine and closed cycle gas turbine, comparison of gas turbines with reciprocating IC engines, applications and limitations of gas turbine	15.	REVISION	
	58 th	Open cycle constant pressure gas turbines - general layout, PV and TS diagram and working of gas turbine, Closed cycle gas turbines, PV and TS Diagram and working.			
	59 th				
	60 th	Principle of operation of ram-jet engine and turbo jet engine - application of jet engines, Rocket engine – its principle of working and applications, Fuels used in jet propulsion.			
16 th	61 st	PTM	16.	VIVA	
	62 nd				
	63 rd				REVISION
	64 th				3rdSessional Test(Tentative)