## **GOVERNMENT POLYTECHNIC JAJPUR**

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## DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN				
Discipline: Mechanical	Semester: 3rd	Name of the Teaching faculty: Suprava Behera		
Subject: Thermal Engineering-I	No of Days/Week class alloted: 4	Semester from Date: 15.09.2022 To Date: 22.12.2022 No of weeks: 15		
Week	Class Day	Topics		
	1st	Concept of Thermodynamic Systems and its classification		
	2nd	Explain closed, open and isolated system		
1st	3rd	Significance of thermodynamic properties of a system		
	4th	Define pressure, volume, temperature, entropy, enthalpy, Internal energy and thunits.		
	1st	Define Intensive and extensive properties, thermodynamic process, path, cycle, state, path function, point function		
2nd	2nd	Explain thermodynamic Equilibrium.		
	3rd	Explain Quasi-static Process.		
	4th	Conceptual explanation of energy and its sources		
		Comparison between Work and heat and solve related topic problems.		
3rd	Manual State of the State of th	Define Mechanical Equivalent of Heat. Explain work transfer and displacement wo		
Siu	3rd	Solve problems related to work transfer and displacement work		
	4th	Solve exercise problems		
	1st	State & explain Zeroth law of thermodynamics.		
ALL		State & explain First law of thermodynamics		
4th		Limitations of First law of thermodynamics and its application		
	4th	Derive Steady flow energy equation and its application to turbine		
<b>SAL</b>		Derive Steady flow energy equation and its application to compressor		
		State 2nd law of thermodynamics and Clausius statements		
5th		State Kelvin planks statement and application of 2nd law in heat engine		
		Application of 2nd law in heat pump and refrigerator		
6th		Determine efficinecy and COP of heat engine		
		Determine efficinecy and COP of heat pump		
	3rd [	Determine efficinecy and COP of heat refrigerator		
	4th	Solve simple problems on heat engine, heat pump and refrigerator		
	1st [	Define perfect gas and laws of perfect gas to determine thermodynamic propert and State Boyle' law, Chalrle's law, Dalton's law of partial pressure		

Ath Explain specific heat of gas (Cp and Cv) and establish relation between Cp an and define enthalpy of a gas  1st Derive workdone during non-flow process  2nd Application of 1st law of thermodynamics to Isothermal process.  3rd Application of 1st law of thermodynamics to Isothermal process.  4th Application of 1st law of thermodynamics to Isothermal process.  1st Application of 1st law of thermodynamics to Isothermal process.  2nd Explain free expansion and throttling process.  3rd Assignment evaluation/ class test  4th Explain and classify I.C engine  1st Define terminolgy o IC engine such as Bore, dead centers  2nd Define stroke volume, piston speed, RPM and their formula.  2nd Explain working principle of 2-stroke C.I Engine  1st Explain working principle of 2-stroke S.I Engine  1st Explain working principle of 4-stroke C.I Engine  1st Explain working principle of 4-stroke C.I Engine  2nd Explain working principle of 4-stroke C.I Engine  2nd Differenciate between 2-stroke and 4-stroke C.I Engine and S.I Engine  3rd Differenciate between 2-stroke and 4-stroke C.I Engine and S.I Engine  4th Derive Carnot cycle  3rd Solve problems related to Carnot cycle  2nd Derive Dual cycle  3rd Solve problems related to Dual cycle  2nd Derive Dual cycle  3rd Solve problems related to Dual cycle  2nd Derive Dual cycle  3rd Solve excercise problems on Otto and Diesel cycle  2nd Define fuel and combustuion and types of fuel  3rd Application of different types of fuel(Isolid fuel)  4th Application of different types of fuel(Isolid fuel)  Application of different types of fuel(Isolid fuel)  2nd Define quality of fuels such as Octane number and Cetane number of I.C engine	7th	2nd	State Gaylussac law, derive general gas equation
and define enthalpy of a gas  1st Derive workdone during non-flow process  2nd Application of 1st law of thermodynamics to Isothermal process.  4th Application of 1st law of thermodynamics to Isobaric process.  4th Application of 1st law of thermodynamics to Isobaric process.  1st Application of 1st law of thermodynamics to Polytropic process.  2nd Explain free expansion and throttling process.  3rd Assignment evaluation/ class test  4th Explain and classify I.C engine  1st Define terminolgy o IC engine such as Bore, dead centers  Define stroke volume, piston speed, RPM and their formula.  3rd Explain working principle of 2-stroke C.I Engine  4th Explain working principle of 2-stroke S.I Engine  1st Explain working principle of 4-stroke C.I Engine  2nd Explain working principle of 4-stroke S.I Engine  3rd Differenciate between 2-stroke and 4-stroke C.I Engine and S.I Engine  4th Derive Carnot cycle  3rd Solve problems related to Carnot cycle  2nd Derive Otto cycle  3rd Solve problems related to Diesel cycle  2nd Derive Dual cycle  3rd Solve problems related to Dual cycle  4th Derive Dual cycle  3rd Solve problems related to Dual cycle  4th Solve excercise problems on Otto and Diesel cycle  1st Solve excercise problems on Dual cycle  2nd Define fuel and combustuion and types of fuel  3rd Application of different types of fuel(Iguid fuel)  4th Application of different types of fuel(Iguid fuel)  4th Application of different types of fuel(Iguid fuel)  Define quality of fuels such as Octane number and Cetane number of I.C engine		3rd	Define characteristic gas constant, Universal gas constant, Solve simple problem
Application of 1st law of thermodynamics to Isothermal process.  4th Application of 1st law of thermodynamics to Isobaric process.  4th Application of 1st law of thermodynamics to Isobaric process.  1st Application of 1st law of thermodynamics to Polytropic process.  2nd Explain free expansion and throttling process.  3rd Assignment evaluation/ class test  4th Explain and classify I.C engine  1st Define terminolgy o IC engine such as Bore, dead centers  2nd Define stroke volume, piston speed, RPM and their formula.  3rd Explain working principle of 2-stroke C.I Engine  4th Explain working principle of 4-stroke C.I Engine  1st Explain working principle of 4-stroke C.I Engine  2nd Explain working principle of 4-stroke C.I Engine  1st Explain working principle of 4-stroke S.I Engine  1st Explain working principle of 4-stroke C.I Engine  4th Derive Carnot cycle  3rd Solve problems related to Carnot cycle  2nd Derive Otto cycle  3rd Solve problems related to Otto cycle  4th Derive Diesel cycle  1st Solve problems related to Diesel cycle  2nd Derive Dual cycle  3rd Solve problems related to Dual cycle  4th Solve excercise problems on Otto and Diesel cycle  1st Solve excercise problems on Otto and Diesel cycle  2nd Define fuel and combustuion and types of fuel  3rd Application of different types of fuel(Iguid fuel)  4th Application of different types of fuel(Iguid fuel)  Define quality of fuels such as Octane number and Cetane numberof I.C engine		4th	Explain specific heat of gas (Cp and Cv) and establish relation between Cp and (and define enthalpy of a gas
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14th Solve excercise problems on Otto and Diesel cycle  1st Solve excercise problems on Dual cycle  2nd Define fuel and combustuion and types of fuel  3rd Application of different types of fuel(solid fuel)  4th Application of different types of fuel(liquid fuel)  1st Application of different types of fuel(gaseous fuel), Heating values of fuels  2nd Define quality of fuels such as Octane number and Cetane number of I.C engine	13th	3rd	·
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15th			Define quality of fuels such as Octage pure have a feeting values of fuels
2rd Assignment qualitation / -	15th		
4th Previous year questions discussion and solve problems.		3rd	Assignment evaluation/ class test

## Learning resources: Sl. No. Publisher Author Title of the book R.S. Khurmi 01 S.Chand Thermal Engineering A.R.Basu 02 Dhanpat Rai Thermal Engineering A.S. Sarao Satya Prakash 03 Thermal Engineering P.K.Nag **Engineering Thermodynamics TMH** 04 Mahesh M Rathore Thermal Engineering **TMH** 05 Signature of Faculty