



Bangladesh Sweden Polytechnic Institute

Kaptai, Rangamati Hill Tracts

Automobile Technology

4th Semester

Semester Plan (Probidan-2022)

Engineering Thermodynamics (27131)

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Teacher's Name: Md. Foyzullah, Junior Instructor (Tech/Power), Automobile Technology

No. of Week	No. of Class	Theory Class Content	Practical Class	Remarks
01	01	1.1 Define thermodynamic, system, boundary, surroundings and the universe. 1.2 Mention types of systems. 1.3 Describe close, open, isolated, flow, non-flow systems. 1.4 Mention the applications of thermodynamics in the engineering field.	Verify First Law of thermodynamics with I.C. Engine	
	02	1.5 Explain the extensive & intensive properties of thermodynamics systems 1.6 Mention the units of thermodynamics systems. 1.7 State thermodynamic state, path, process, quasi-static process, reversible & irreversible process and Thermodynamics equilibrium. 1.8 Define point function, path function and control volume.		
	03	2.1 Define heat, temperature and pressure. 2.2 Explain different types of heat, temperature scale and pressure. 2.3 Mention the units of heat, temperature scale and pressure. 2.4 Convert one unit to another unit of heat, temperature scale and pressure. 2.5 Distinguish between heat and temperature. 2.6 Explain heat is a low-grade energy and work is a high-grade energy. 2.7 Solve problems on heat, temperature scale and pressure.		
02	01	3.1 State the Zeroth law of thermodynamics. 3.2 Mention the First law of thermodynamics. 3.3 Describe the First law of thermodynamics	Verify Second Law thermodynamics with I.C. Engine	
	02	3.4 Explain the limitation of First law of thermodynamics. 3.5 State the corollaries of First law of thermodynamics. 3.6 Describe the first law closed system application. 3.7 Describe the first law open system application.		
	03	4.1 State the 2 nd law of thermodynamics. 4.2 Explain the 2 nd law of thermodynamics. 4.3 Explain the limitation of 2 nd law of thermodynamics. 4.4 State the corollaries of 2 nd law of thermodynamics. 4.5 Describe the physical significance of 1 st and 2 nd law of thermodynamics.		
03	01	4.6 State the 3 rd law of thermodynamics. 4.7 Solve problems on the laws of thermodynamic.	Verify the second law of thermodynamics with the	

	02	5.1 Define internal energy. 5.2 Define enthalpy & specific enthalpy. 5.3 Explain the internal energy of a gas heated at constant volume and constant pressure.	refrigeration cycle	
	03	5.4 Relate between internal energy and enthalpy. 5.5 Explain Joule's law. 5.6 Solve problems on change of internal energy and enthalpy of gases.		
04	01	Quiz Test-01	Compare Otto and Diesel cycles	
	02	6.1 State thermodynamic processes. 6.2 Explain the flow processes and non-flow processes of gases. 6.3 Describe the various non-flow thermodynamic processes with P-V and T-S diagrams.		
	03	6.4 Determine the work done by the gases during the above process. 6.5 Explain the steady and unsteady flow processes. 6.6 Describe the steady flow energy equations. 6.7 Solve problems on thermodynamic processes.		
05	01	7.1 Define entropy. 7.2 State the importance of entropy. 7.3 Describe the principle of increase of entropy. 7.4 Explain the relation between heat & entropy.	Compare radiators, evaporators and condensers of heat exchangers	
	02	7.5 Describe the general expression for change of entropy of a perfect gas during various thermodynamic processes. 7.6 Solve problems on entropy of different thermodynamic processes.		
	03	8.1 Mention the three-state of a substance. 8.2 Distinguish between steam and vapors. 8.3 Discuss the triple point of a substance. 8.4 List the properties of vapors.		
06	01	Class Test-01	Demonstrate the 4-stroke Otto Cycle with an engine	
	02	8.5 Explain the formation of steam at constant pressure. 8.6 Describe wet steam, dry saturated steam, superheated steam, dryness fraction, specific volume of steam.		
	03	9.1 Define thermodynamic cycle. 9.2 Classify the thermodynamic cycle. 9.3 Explain the reversible and irreversible cycles.		
07		Mid Term Examination		
08	01	10.1 Define Air Standard Cycle. 10.2 Describe the Carnot cycle with P-V and T-S diagrams. 10.3 Calculate air standard efficiencies of Carnot cycles.	Demonstrate the 4-stroke Diesel Cycle with an engine	
	02	10.4 State Otto cycle, Diesel cycle with P-V and T-S diagrams of conventional air cycles. 10.5 Explain the air standard efficiency of Otto cycle, Diesel cycle.		
	03	10.6 Compare Otto and Diesel cycles. 10.7 Compare the theoretical Otto and Diesel cycles with the actual Otto and Diesel cycles. 10.8 Solve problems on different air cycles.		

09	01	11.1 Define vapor power cycle. 11.2 Describe the Rankin cycle with incomplete evaporation and modified Rankine cycle with superheated steam. 11.3 Define reheat, regenerative and reheat-regenerative vapor cycles.	Determine the mechanical equivalent of heat by Joule's apparatus	
	02	11.4 Explain the reheat, regenerative and reheat-regenerative vapor cycles with P-V and T-S diagrams. 11.5 Distinguish among the reheat, regenerative and reheat-regenerative vapor cycles. 11.6 Describe the binary vapor cycle and topping cycle.		
	03	12.1 State heat engine, refrigeration and heat pump. 12.2 Describe the reverse cannot cycle with P-V and T-S diagrams. 12.3 Describe the vapor compression mechanical refrigeration cycle.		
10	01	Quiz Test-02	Demonstrate the heat transfer modes Conduction, convection and radiation with refrigerator	
	02	12.4 Calculate the Coefficient of performance COP (heating & refrigerating) 12.5 Describe the capacity of the refrigerating machine.		
	03	12.6 Describe the vapor absorption refrigeration cycle. 12.7 Solve problems on COP and TR.		
11	01	Class Test-02	Observe Rankin cycle with a steam turbine model	
	02	13.1 Define IC engine. 13.2 Classify the IC engine on the basis of different terms. 13.3 Explain the terms bore and stroke, piston displacement, clearance volume and compression ratio.		
	03	13.4 List the moving parts and stationery parts of an IC engine. 13.5 Mention the function of stationary and moving parts of an IC engine. 13.6 State the working principle of 2-stroke and 4-stroke SI & CI engines. 13.7 Compare the 2-stroke and 4-stroke engines.		
12	01	14.1 Explain the three modes of heat transfer. 14.2 Distinguish among conduction, convection and radiation of heat. 14.3 Explain Fourier's law of thermal conductivity. 14.4 Explain Newton's law of cooling for convective heat transfer.		
	02	14.5 State Stefan-Boltzmann law of heat radiation. 14.6 Define heat exchanger. 14.7 Classify heat exchangers. 14.8 Explain Radiator, condenser and Evaporator of heat exchangers.		
	03	15.1 Define boiler. 15.2 Classification of boilers. 15.3 Discuss the different types of boiler 15.4 Mention the utility of boiler. 15.5 State the operational procedure of boiler operation. 15.6 Merits and demerits of fire tube and water tube boiler. 15.7 Explain boiler efficiency.		

REFERENCE BOOKS:

Author Title Publisher

- Thermal Engineering- Mahesh M Rathore.
- Thermal Engineering Heat Power- A R Basu.
- A Text book of ThermalEngineering - R. S. Khurmi and J. K.Gupta.
- Basic and applied thermodynamics- P K Nag.
- Applied Thermodynamics- Rai & Sarao.
- Heat &Mass Transfer- Dr. D.S. Kumar.
- Thermal Engineering- A.S. Sarao.
- Heat and Mass Transfer- H.B.Kaswani.
- Heat Thermodynamics and Statistical Physics- Brijlal-N. Subrahmanyam, P.S.Hemen.