

Bangladesh Polytechnic Institute

Technology: **Mechanical**

Semester: 6th

Sub. Name: THERMODYNAMICS AND HEAT ENGINES (7065)

T P C: 3 3 4

Course Outline

Teacher Name: Md. Masum Reza

Mob.No: 01765 07 40 27

Class No.	Discussion and Explanation of Topics/ Titles	Remarks
Class-1	<ul style="list-style-type: none"> ❖ Understand the scope and basic concept of thermodynamics. ➤ Define thermodynamics. ➤ Mention different applications of thermodynamics in engineering field. ➤ Define temperature. ➤ Define heat. 	
Class-2	<ul style="list-style-type: none"> ❖ Understand the scope and basic concept of thermodynamics. ➤ Mention the units of heat and their conversion. ➤ Distinguish between heat and temperature. ➤ Compare the heat and work. ➤ Solve problems on converting heat units. 	
Class-3	<ul style="list-style-type: none"> ❖ Understand the concept of specific heat of gases. ➤ Define specific heat, thermal capacity and water equivalent. ➤ Describe the terms specific heat at constant pressure (C_p) and specific heat at constant volume (C_v). ➤ Relate two specific heats (C_p and C_v). ➤ Mention the value of C_p, C_v and γ for some common gases. 	
Class-4	<ul style="list-style-type: none"> ❖ Understand the concept of latent heat and sensible heat. ➤ Define sensible heat and latent heat. ➤ Classify and explain of latent heats. ➤ List the values of different latent heat for water and ice in different units. 	
Class-5	<ul style="list-style-type: none"> ❖ Understand the concept of latent heat and sensible heat. ➤ Compute the formulae to calculate sensible heat and latent heat. ➤ Solve problems on sensible heat, latent heat and total heat. 	
Class-6	<ul style="list-style-type: none"> ❖ Understand the properties and laws of perfect gases. ➤ Define perfect gas. ➤ Explain the variables of perfect gases. ➤ State Boyle's law, Charle's law and GayLussac law. 	
Class-7	<ul style="list-style-type: none"> ❖ Understand the properties and laws of perfect gases. ➤ Explain the general gas equation, characteristic gas equation and universal gas constant or molar constant. ➤ State Joule's law and Avogadro's law. ➤ Solve problems using gas laws and equations. 	
Class-8	 Feedback	
Class-9	 Feedback	
Class-10	<ul style="list-style-type: none"> Understand the internal energy of gases. ➤ Define internal energy. ➤ Explain the internal energy of gas heated at constant volume and constant pressure. 	
Class-11	 Feedback	

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Class-12	 Class Test-1	
Class-13	<p>Understand the internal energy of gases.</p> <ul style="list-style-type: none"> ➤ Define internal energy. ➤ Express the derivation of the equation for increase in internal energy . $Q= m C_v (T_2-T_1)$. ➤ Solve problems on change of internal energy. 	
Class-14	<p>❖ Understand the aspects of thermodynamic systems.</p> <ul style="list-style-type: none"> ➤ Define thermodynamic system, boundary and surrounding. ➤ Mention the classification of the thermodynamic systems. 	
Class-15	<p>❖ Understand the aspects of thermodynamic systems.</p> <ul style="list-style-type: none"> ➤ Explain the closed system, open system and isolated system with example. ➤ List the properties of thermodynamic systems. 	
Class-16	<p>❖ Understand the laws of thermodynamics.</p> <ul style="list-style-type: none"> ➤ State the laws of thermodynamics. ➤ Explain the 1st law of thermodynamics. ➤ Mention the significance and limitations of 1st law of thermodynamics. 	
Class-17	<p>❖ Understand the laws of thermodynamics.</p> <ul style="list-style-type: none"> ➤ Explain the 2nd law of thermodynamics. ➤ Mention the application of 2nd law of thermodynamics in refrigeration cycle. ➤ Solve problems on laws of thermodynamics. 	
Class-18	<p>❖ Understand the thermodynamic processes of perfect gases.</p> <ul style="list-style-type: none"> ➤ Define thermodynamic process. ➤ Classify thermodynamic processes. ➤ List the various thermodynamic processes of perfect gases. 	
Class-19	<p>❖ Understand the thermodynamic processes of perfect gases.</p> <ul style="list-style-type: none"> ➤ Describe constant volume, constant pressure, isothermal and adiabatic thermodynamic processes with P-V & T-S diagrams. ➤ Solve problems on thermodynamic processes. 	
Class-20	 Feedback	
Class-21	 Feedback	
	Model Test	
Class-22	 Feedback	
Class-23	<p>❖ Understand the entropy and enthalpy of perfect gases.</p> <ul style="list-style-type: none"> ➤ Define entropy and enthalpy. ➤ Mention the units of entropy and enthalpy. ➤ Mention the significance of entropy and enthalpy. ➤ Explain the relation between temperature and entropy. 	
Class-24	<p>❖ Understand the entropy and enthalpy of perfect gases.</p> <ul style="list-style-type: none"> ➤ Express the mathematical deduction of enthalpy. ➤ Explain the change of entropy of a perfect gases and vapors during constant volume, constant pressure, 	

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	<ul style="list-style-type: none"> isothermal and adiabatic thermodynamic processes. ➤ Solve problems on entropy and enthalpy of above mentioned thermodynamic processes. 	
Class-25	<ul style="list-style-type: none"> ❖ Understand the aspects of thermodynamic cycles. ➤ Classify and explain thermodynamic cycles. ➤ List the assumption in thermodynamic cycles. ➤ Explain the reversible and irreversible cycles. 	
Class-26	<ul style="list-style-type: none"> ❖ Understand the aspects of thermodynamic cycles. ➤ State the meaning of air standard cycle, gas power cycle and vapor power cycle. ➤ Describe the carnot cycle, Otto cycle, and diesel cycle with P-V and T-S diagrams. 	
Class-27	<ul style="list-style-type: none"> ❖ Understand the features of internal combustion engine. ➤ State the meaning of internal combustion (IC) engine. ➤ Classify IC engines. ➤ Define bore, stroke, clearance volume, swept volume, total volume and compression ratio. 	
Class-28	 Feedback	
Class-29	 Feedback	
Class-30	<ul style="list-style-type: none"> ❖ Understand the features of internal combustion engine. ➤ Distinguish between the 2-stroke and 4-stroke engines. ➤ Identify the stationary parts and moving parts of IC engine. ➤ Mention the function of major IC engine components 	
Class-31	<ul style="list-style-type: none"> ❖ Understand the features of petrol engine. ➤ Mention the principle of operation of a 4-stroke and a 2-stroke petrol engine. ➤ Compare the 2-stroke and 4-stroke petrol engines. 	
Class-32	<ul style="list-style-type: none"> ❖ Understand the features of petrol engine. ➤ Describe the construction and components of petrol engine. ➤ Mention the uses of petrol engine. 	
Class-33	 Class Test-2	
Class-34	<ul style="list-style-type: none"> ❖ Understand the features of petrol engine. ➤ Mention the principle of operation of a 4-stroke and a 2-stroke petrol engine. ➤ Compare the 2-stroke and 4-stroke petrol engines. 	
Class-35	<ul style="list-style-type: none"> ❖ Understand the features of petrol engine. ➤ Describe the construction and components of petrol engine. ➤ Mention the uses of petrol engine. 	
Class-36	<ul style="list-style-type: none"> ❖ Understand the features of diesel engine. ➤ Mention the principle of operation of a 4-stroke and a 2-stroke diesel engine. ➤ Compare 2-stroke and 4-stroke diesel engine. 	
Class-37	<ul style="list-style-type: none"> ❖ Understand the features of diesel engine ➤ Describe the construction and components of diesel engine. ➤ Mention the uses of diesel engine. 	
Class-38	<ul style="list-style-type: none"> ❖ Understand the properties of steam. ➤ Define steam. ➤ Explain the formation of steam at constant pressure. 	

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	➤ Describe the important terms for steam (wet steam, dry saturated steam, superheated steam, dryness fraction, quality of wet steam, specific volume of steam, etc.).	
Class-39	 Feedback	
Class-40	 Feedback	

Reference Book:-

1. Engineering Thermodynamics
– R.S.Khurmi
2. Engineering Thermodynamics
– P..K. Nag
3. Heat and Thermodynamics
– Brij lal