

**II B.Tech II Semester Supplementary Examinations, April/May 2005**  
**THERMODYNAMICS**  
**(Bio-Medical Engineering)**

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) State and study the thermodynamics with the view point of microscopic and macroscopic approach.  
(b) The properties of a closed system undergo change following the relation  $PV=4$  where P is in bar and V in  $m^3$ . Calculate the work done when P increases from 2.5 bar to 8 bar.
2. (a) State and explain laws of thermodynamics.  
(b) The minimum power required to drive a heat pump which maintains a house of  $20^\circ\text{C}$  is 3.5 kW. If the outside temperature is  $2^\circ\text{C}$ , estimate the amount of heat which the house lowers per minute.
3. (a) What is an isothermal process? Derive an expression for the work done during an isothermal process.  
(b) What is polytropic process. How does it differ from adiabatic process.
4. (a) What are the assumptions for a steady flow process. Write the general energy equation for a steady flow system.  
(b) Briefly discuss the general laws for expansion and compression of a perfect gas with PV diagram.
5. (a) Write down Vander waal's equation of state. How does it differ from ideal gas equation.  
(b) Compute the specific entropy of steam in the following states.
  - i. Dry and saturated at 10 bar abs.
  - ii. Saturated at 8 bar, 0.9 dry.
  - iii. Superheated at 12 bar and  $300^\circ\text{C}$ . Take  $C_P=2.09$ .
6. (a) Obtain the expression for entropy at:
  - i. Dry and saturated steam
  - ii. Wet steam and
  - iii. Super heated steam.  
(b) Explain the following:
  - i. Compressibility factor and
  - ii. Compressibility charts.

7.
  - (a) Define psychrometry. What is the importance of psychrometry in the field of air conditioning.
  - (b) What is the specific humidity of atmospheric air at 1.0132 bar and  $23^{\circ}\text{C}$  having a relative humidity of 0.34.
8. Write short notes on:
  - (a) Diesel cycle
  - (b) Vapour compression cycle
  - (c) Rankine cycle.
  - (d) Dual-combustion cycle

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