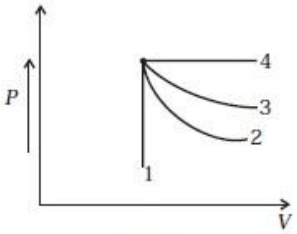
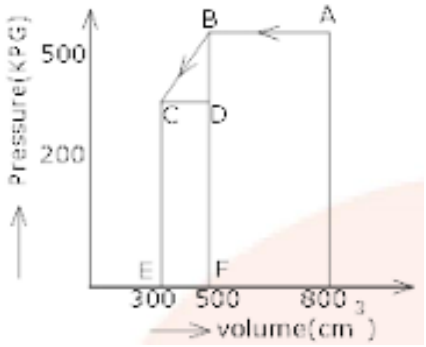
Nitin Sir

F.M : 25	THERMODYNAMICS TEST	TIME: 1 HOUR

1. An ideal gas undergoes four different processes from the same initial state. Four processes are adiabatic, isothermal, isobaric and isochoric. Out of 1, 2, 3 and 4 which one is adiabatic. (1)



2. If an average person jogs, he produces 14.5×10^3 cal/min. This is removed by the evaporation of sweat. The amount of sweat evaporated per minute (assuming 1 kg requires 580×10^3 cal for evaporation) is: (1)
   A. 0.25 kg B. 2.25 kg C. 0.05 kg D. 0.20 kg
3. An ideal gas undergoes isothermal process from some initial state i to final state f. Choose the correct alternatives. (1)
   A. dU = 0 B. dQ= 0 C. dQ = dU D. dQ = dW
4. State zeroth law of thermodynamics. (1)
5. Boyle's law is equivalent to _____ process in thermodynamics. (1)
6. Consider a Carnot's cycle operating between T_1 = 500K and T_2 = 300K producing 1 k J of mechanical work per cycle. Find the heat transferred to the engine by the reservoirs. (2)
7. Is it possible to increase the temperature of a gas without adding heat to it? Explain. (2)
8. Calculate the work done by the gas in going from point A to B to C from the PV graph of the thermodynamic behavior of the gas. (2)



9. A gas at atmospheric pressure is compressed adiabatically until its volume becomes half of the original volume. Calculate the resulting pressure. (2)
10. A steam engine delivers 5.4×10^8 J of work per minute and services 3.6×10^9 J of heat per minute from its boiler. What is the efficiency of the engine? How much heat is wasted per minute? (2)
11. A) In a refrigerator one removes heat from a lower temperature and deposits to the surroundings at a higher temperature. In this process, mechanical work has to be done, which is provided by an electric motor. If the motor is of 1kW power, and heat is transferred from –3°C to 27°C, find the heat taken out of the refrigerator per second assuming its efficiency is 50% of a perfect engine.
    b) If the co-efficient of performance of a refrigerator is 5 and operates at the room temperature (27 °C), find the temperature inside the refrigerator. (5)
12. State and derive Mayer's relation.
    " A gas can have any value of specific heat depending on how heating is carried out". Explain (5)

Address: Vivekanand Apartment, Ground Floor, D-3 Diamond park, Joka, Kolkata - 700104
Phone: +91-8617247400 ; **Email**: connect@nitintibrewal.com; **Website**: www.nitintibrewal.com