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Probable questions

Thermal engineering-1

2 marks questions

1. What is quasi-static process? (2009w)
2. De fine closed system and open system. (2014w,2011w)
3. Differentiate between path and process. (2014w)
4. Distinguish between intensive property and extensive properties (2011w,2014w,2015w)
5. State zeroth law of thermodynamic . (2011w,2013w,2015w)
6. Define heat ,work and state their units. (2006w, 2007w, 2011w,2016w)
7. Define energy. State law of conservation of energy and units of energy in SI unit. (2011w,2012w)
8. Name the modes of heat transfer. (2002w,2011w,2014w)
9. State first law of thermodynamic based upon system and its change of state points . (2011w,2014w,2016w)
10. Define enthalpy.
11. State Kelvin-plank statement of second law of thermodynamics. (2011w, 2016w, 2014w)
12. Write clausius inequality equation for reversible cycle. (2011w,2014w,2015w)
13. Define COP. (2011w,2016w)
14. Give P-V and T-S diagram of carnot cycle. (2011w,2016w)
15. Define entropy. (2011w,2013w,2015w, 2016w

5- marks questions

1. Explain difference between intensive and extensive properties with examples. (2014w,2015o)
2. Explain different modes of heat transfer. (2013w,2015w,2016w)
3. Explain the concept of displacement work .
4. Explain the concept of enthalpy.
5. Define first law of thermodynamics and describe the application of steady flow energy equation for nozzle. (2014w)
6. Explain heat engine , heat pump and refrigerator. (2015o, 2016w)
7. Derive the effiency of Carnot heat engine. (2011w)
8. Derive the relationship between C_p and C_v. (2014w,2015o,2015w)
9. Derive workdone during an isothermal process. (2011w,2014w,2015w)
10. Derive the relation between pressure and temperature for an isentropic process (2016w)

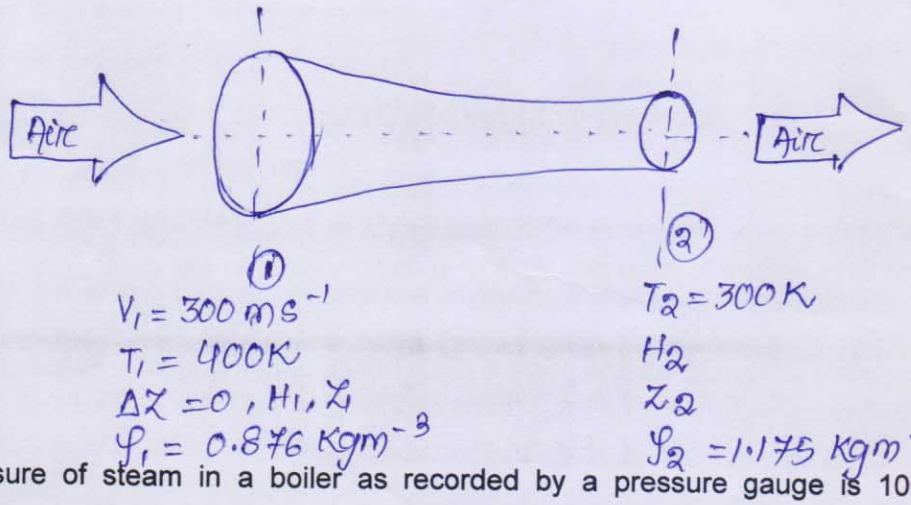
7-marks Questions

1. Derive general gas equation $\frac{pv}{T}$=constant. (2015)
2. 0.1m^3 of air at a pressure of 1.5 bar and temperature of 40^{0}c is expanded isothermally to 0.5 m^3. Determine(i)Final pressure of air (ii)Work done during the process (iii)Change in entropy (iv)mass of the air. (2016w)

3. A gas volume 0.14 m^3 expands polytropically from a pressure of 2.07 Mpa to 207Kpa. The polytropic exponent n=1.35. Determine the work done by the gas during expansion. (2010,2016w)

4. Air at the rate of 3600Kgh^{-1} is flowing through a converging nozzle as shown in the fig. Air temperature at the inlet is 400k,Air temperature at the outlet is 300k,Air velocity at the nozzle inlet is 300m/s, specific heat of air at constant pressure is 1kjkg^{-1}k^{-1}. Determine (i) the exit velocity of air (ii) ratio of the inlet to the exit flow area of the nozzle.

Fig;



5. The pressure of steam in a boiler as recorded by a pressure gauge is 100 bar . If the outside atmospheric pressure is 750mm of Hg, Find the absolute pressure of steam in bar and mm of Hg.

(2014w,2016w)

6. A cold storage unit of 30 tone of refrigeration capacity operates between 263K and 303K. Determine the monthly cost of running the plant if it runs 16 hrs a day and if the plant sports half of the COP of the carnot cycle (take 30 days a month)

7. An engine on Carnot cycle receives heat at 800^{0}c and rejects heat at 30^{0}c. find the efficiency of the cycle. If the engine receives 5000kj of heat per minute from the source , calculate the power developed by the engine. (2016w)

8. Determine the heat required to generate 5 kg of steam from water at 30^{0}c under a pressure of 6bar when the steam is wet with dryness fraction 0.9. (2014w,20134w)

9. Explain the principle of increase of entropy. (2016w)

10. A gas in a closed system undergoes a constant pressure at 690 Kpa and its volume increases from 0.3 m^3 to 0.1m^3. If the initial temperature of the gas is 500^{0}c , determine (i) mass of the gas(ii)specific heat transfer (iii)change of internal energy (iv) work transfer (take c_p=1.005kj/kgk & c_v=0.718kj/kgk) (2013w, 2014w)

11. A closed vessel contains 2 kg of co_2.at a temperature 20^{0}c and pressure 0.7 bar .Heat is supllied to the vessel till the gas acquire a pressure of 1.4 bar. Calculate (i) final temperature (ii)work done on or by the gas (iii)Heat added (iv) change in internal energy (Take c_v=0.657kj/kgk)(2016w,2015w,2014w)

12. 0.25 $m^3$of a gas at 288k and 100kpa is compressed adibaticallyto 700 kpa . Calculate (i) the final temperature of the gas (ii) the work done on the gas. (Take c_p=1.001 kj/kgk & c_v=0.715kj /kgk)

(2012w,2013, 2014w)