ANNA UNIVERSITY COIMBATORE

B.E. / B.Tech. DEGREE EXAMINATIONS - DECEMBER 2008

THIRD SEMESTER – ELECTRICAL & ELECTRONICS ENGG.

EE 304 – APPLIED THERMODYNAMICS

Time: Three Hours **Maximum: 100 Marks**

(Use of Approved Thermodynamic Charts and Tables permitted)

PART A – (20 x 2 = 40 Marks)

Answer ALL Questions

1. State first law of thermodynamics.
2. Define path and point function.
3. State Carnot's theorem.
4. Define thermodynamic equilibrium.
5. Define scavenging.
6. State any two disadvantages of 2-stroke engines.
7. What are the main components of a gas turbine power plant?
8. State the assumptions made in a standard air cycle analysis.
9. Give the examples of impulse and reaction turbines.
10. What is meant by compounding of turbines?
11. Define latent heat of vaporization.
12. What is the function of an Economizer and super heater in a boiler?
13. Define volumetric efficiency.
14. What is meant by free air delivered?
15. Define compression ratio.
16. What is the purpose of inter cooler?
17. Define dew point temperature.

18. Define tone of refrigeration.
19. What is sub cooling?
20. Distinguish between refrigeration and air-conditioning.

PART - B (5 × 12 = 60 Marks)

Answer Any FIVE Questions

21.a. A cyclic heat engine operates between a source temperature of 800°C and a sink temperature of 30°C. What is the least rate of heat rejection per KW net output of the engine? (4)

b. Derive the S.F.E.E. for a single stream entering and a single stream leaving a control volume and explain the various terms in it. (8)

22.a. With a neat sketch explain the working principle of a four stroke diesel engine. (8)

b. Compare SI and CI Engines. (4)

23.a. With a neat layout explain the working principle of a steam power plant. (8)

b. Differentiate between impulse and reaction turbines. (4)

24.a. In a ideal Brayton cycle, air from the atmosphere at 1 atm, 300 K is compressed to 6 atm and the maximum cycle temperature is limited to 1100 K by using large air-fuel ratio. If the heat supply is 100 MW, find : i) the thermal efficiency of the cycle, ii) work ratio, iii) power output, iv) energy flow rate of the exhaust gas leaving the turbine. (8)

b. Compare Open and closed cycle gas turbines (4)

25.a. A boiler working at a pressure of 14 bar evaporates 8.6 kg of water per kg of coal fired from feed water entering at 39°C. The steam at the boiler stop valve is 0.92 dry. Determine the equivalent evaporation from and at 100°C. Also determine the thermal efficiency of the boiler if the calorific value of the coal is 30200 KJ/Kg. (8)

b. What is enthalpy of steam and define dryness fraction? (4)

26.a. Explain the working of a single cylinder reciprocating air compressor with a neat sketch. (6)

b. Prove that the inter stage pressure P_2 is the geometric mean of the initial pressure P_1 and final pressure P_3 in a two stage reciprocating air compressor. (6)

27.a. Explain the vapour compression cycle with the help of T - S diagram. (8)

b. A refrigeration system works on reversed Carnot's cycle between temperature limits of 40°C and -10°C. The capacity of the unit is 10 tonne. Determine (i) COP (ii) Work Input into the system. (4)

28.a. Explain the window air conditioning system with a neat sketch. (8)

b. Define dry bulb and wet bulb temperature. (4)

******THE END******