

Sub: Thermal Engineering II

4th sem, mechanical Engineering

Short type questions

- 1) What is a pure substance ?
- 2) What is a triple point ?
- 3) How do you define the thermal conductivity of a material ?
- 4) What do you understand by the terms 'convective heat transfer co-efficient' and 'overall heat transfer co-efficient'.
- 5) What do you mean by Dryness fraction of steam?
- 6) Describe the different operations of Rankine cycle.
- 7) What are the advantage of reheating ?
- 8) What is mollier chart ?
- 9) What is Brake mean effective pressure and Indicated mean effective pressure ?
- 10) What is Indicated thermal efficiency ?
- 11) Describe the working of single stage reciprocating compressor.
- 12) Write short notes on volumetric efficiency ?
- 13) Differentiate between fire tube and water tube boilers.
- 14) Differentiate between mountings and accessories.
- 15) What is boiler mounting
- 16) What is intercooler?
- 17) What is brake thermal efficiency ?
- 18) What is drought? Name the different drought system used in boiler?
- 19) What is critical point ?
- 20) What is steadily boltzs man law of conduction ?

Long type questions

1. 1000 kg of steam at a pressure of 16 bar and 0.9 dry is generated by a boiler per hour. The steam passes through a superheater via boiler stop valve where its temperature is raised to 380°C. If the temperature of feed water is 30°C, determine :
 - i) The total heat supplied to feed water per hour to produce wet steam.
 - (ii) The total heat absorbed per hour in the superheater. Take specific heat for superheated steam as 2.2 kJ/kg K.
2. Explain the following terms relating to steam formation :
 - (i) Sensible heat of water,
 - (ii) Latent heat of steam,
 - (iii) Dryness fraction of steam,
 - (v) Superheated steam.

(iv) Enthalpy of wet steam

3. State the methods of increasing the thermal efficiency of a Rankine cycle.
4. Explain with the help of neat diagram a 'Regenerative Cycle'. Derive also an expression for its thermal efficiency
5. A two stroke two cylinder engine runs with speed of 3000 rpm and fuel consumption of 5 litres/hr. The fuel has specific gravity of 0.7 and air-fuel ratio is 19. The piston speed is 500 m/min and indicated mean effective pressure is 6 bar. The ambient conditions are 1.013 bar, 15°C. The volumetric efficiency is 0.7 and mechanical efficiency is 0.8. Determine brake power output considering $R_{\text{for gas}} = 0.287 \text{ kJ/kg} \cdot \text{K}$ (Take piston speed, $\text{m/min} = 2 LN$ where L is stroke (m) and N is rpm)
6. Discuss the significance of intercooling upon the performance of multi-stage compression.
7. A reciprocating compressor of single stage, double acting type delivers 20 m³/min when measured at free air condition of 1 bar, 27°C. The compressor has compression ratio of 7 and the conditions at the end of suction are 0.97 bar, 35°C. Compressor runs at 240 rpm with clearance volume of 5% of swept volume. The L/D ratio is 1.2. Determine the volumetric efficiency and dimensions of cylinder and isothermal efficiency taking the index of compression and expansion as 1.25. Also show the cycle on P-V diagram
8. Write short notes on, water level indicator, safety valves, fusible plug, feed check valve, pressure gauge, stop valve and blow off cock.
9. Sketch and completely label a Lancashire boiler. Also explain its' working.
10. Sketch and completely label a Cochran boiler. Also explain its' working.