AMIRAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT: MECHANICAL SEMESTER: 3
SUBJECT NAME: Engineering Thermodynamics
SUBJECT CODE: 3131905
FACULTY NAME: PROF. KEVAL SUTHAR

Assignment: 4

VAPOR POWER CYCLES

1. With the help of schematic diagram, derive an expression for Rankine cycle. Also represent it on p-v, T-s and h-s diagram. Identify the reheating process and locate the increase in work done due to reheating in both graph.

2. Compare the Carnot and Rankine cycle with the help of T-s diagram.

3. Explain the effect of following on the efficiency of Rankine cycle. (i) superheating of steam (ii) Turbine inlet steam pressure (iii) condenser pressure

4. What is the effect of regeneration? On the (i) specific output, (ii) mean temperature of heat addition (iii) cycle efficiency and (iv) steam rate

5. What do you understand by steam rate and heat rate? What are their units?

6. What do you understand by the mean temperature of heat addition? For a given T_2, show how the Rankine cycle efficiency depends on the mean temperature of heat addition.

GAS POWER CYCLES

7. Explain using p-v and T-s diagram, which of the two cycles – Otto cycle and Diesel cycle, will have higher efficiency for a given maximum pressure and temperature in the cycle?

8. Compare Otto, Diesel and Dual cycle for

   (i) Same compression ratio and heat supplied.

(ii) Same maximum pressure and temperature.

9. What are the air standard assumptions? Show that the air standard efficiency of Brayton cycle is given by

$$\eta = 1 - \frac{1}{r_p^{\frac{\gamma-1}{\gamma}}}$$

Where r_p is pressure ratio and γ is ratio of specific heats

10. Sketch the air-standard Brayton cycle on P-v and T-s diagrams. What are the advantages of the Brayton cycle over the conventional heat engine cycles?

REFRIGERATION CYCLES

11. Explain standard vapour compression refrigeration cycle with T-s and P-h diagram. What is the effect of sub-cooling on the performance of vapour compression refrigeration system?

12. Explain the effects of change of suction pressure and delivery pressure on performance of vapour compression refrigeration using p-h and T-s diagram.

13. What is the difference between Ideal and Actual vapour compression cycles?

14. Draw p-h diagrams for dry compression, wet compression, superheating after compression, superheating before compression and sub-cooling.

15. Define COP and EER.

16. Explain reversed Carnot cycle. What are its limitations?