

Roll No

ME - 404**B.E. IV Semester**

Examination, June 2013

Thermal Engineering And Gas Dynamics**Time : Three Hours****Maximum Marks : 70/100**

Note: Attempt five questions, one from each unit. User of steam tables, and Mollier chart are permitted.

Unit - I

1. a) Describe with neat sketch the working of Loeffler Boiler?
b) Defines the following terms for the boiler equivalent evaporation, Boiler performance and Boiler Rating.

OR

2. Draw a heat balance sheet for the
boiler pressure of steam = 15 bar,
steam condensed = 500 kg/hr,
fuel used = 70 kg/hr,
moisture in fuel = 4% by mass,
mass of dry fuel gases = 8 kg/kg
of fuel calorific value of fuel = 38,000 kJ/kg
temperature of flue gases = 350°C
Temperature of boiler house = 28°C,
Feed water temperature = 40°C,
mean specific heat of flue gases = 1 kJ/kg.k
Dryness fraction = 0.96

Unit - II

3. a) What are the limitations of Carnot cycle?
b) Derive an expression for efficiency of modified Rankine cycle.

OR

4. A Reheat cycle operating between 30 and 0.05 bar has a super heat and Reheat temperature of 450°C. The first expansion take place till the system is dry saturated and then reheat is given. Determine the ideal cycle efficiency and neglect feed pump work. **WWW.RGPVONLINE.COM**

Unit - III

5. a) Define the following terms for GDS dynamics and steam nozzle.
i) Mack cone ii) Critical pressure ratio
iii) Super-saturated flow iv) Normal shock

OR

6. Calculate mass flow rate of steam in a convergent nozzle with the data given below
Inlet pressure = 10 bar,
Inlet temperature = 200°C
Back pressure = 0.5 bar
Throat diameter = 10mm

Unit - IV

7. a) Classify rotary compressor?
b) Explain with neat sketch working of reciprocating compressor?

OR

8. Find the maximum work and power required to drive the compressor for a two stage air compressor which takes 3m^3 at air minute at a pressure of 1 bar and temperature process follows the level $PV^{1.25} = C$. Also find the inter cooler pressure.

Unit - V

9. a) Explain various sources of air leakage into steam condenser?
b) Explain design of Heat-Exchanger.

OR

10. A surface condenser deals with 13625 kg of steam per hour at a pressure of 0.09 bar. The steam enters 0.85 dry and the temperature of the condenser and air extraction pipes is 36°C . The air leakage amount to be 7.26 kg/hr.

Determine :

- i) The surface area required, if average heat transmission rate is 3.97 kJ/cm^2
- ii) The cylinder diameter of dry air pump if, it is to be a single acting reciprocating type, runs at 60 rpm with stroke to bore ratio of 1.25 and Volumetric ratio 0.85.