

Examination May-2014
APPLIED THERMODYNAMICS-I
Subject Code : ME209
Paper ID: A0805

Time : 3 Hours

Maximum Marks : 60

SECTION-A

(2x10=20)

Answer all the parts in Question no .1

- Q1.** (a) List 5 Gaseous fuels and their advantages.
(b) What can be different uses of the steam produced by the boilers ?
(c) How do you define equivalent evaporation in the boilers?
(d) State the function and types of steam separators ?
(e) Draw a combined power cycle.
(f) What is the effect of friction during flow through nozzle
(g) What is the purpose of compounding in impulse turbines
(h) What is the advantage and purpose steam bleeding in Turbines
(i) What are the effects of air leakage in a condenser.
(j) Explain the terms
(i) vacuum efficiency and (ii) Condenser efficiency.

SECTION-B

4x5=20

Answer any Four Questions in Section-B.

- Q2.** A compressor is required to compress air at 1 bar and 25°C and deliver at 160 bar using multi stage compression and intercoolers. The maximum temperature during. Compression should not exceed 125°C and the cooling in intercooler is done so as not to drop the temperature below 40°C. Taking the law of compression $p v^{1.25} = \text{constant}$ for all stages. Calculate the number of stages required and head rejected in intercoolers.
- Q3.** The following data were taken during the test on a boiler for a period of one hour.
steam generated = 5000kg, coal burnt = 700kg, calorific value of coal = 31402 kJ/kg quality of steam = 0.92 If the boiler pressure is 1.2 mpa and the feed water temperature is 45°C, find the boiler equivalent evaporation and boiler efficiency.
- Q4.** Explain the working of a steam injector with neat sketch showing velocity and head at different points.
- Q5.** Explain the evaluation of (i) Blade or diagram efficiency (ii) stage efficiency (iii) overall turbine efficiency and (iv) net efficiency or efficiency ratio for an impulse turbine.
- Q6.** Giving a classification of condensers, explain the working of evaporative type surface condenser.

SECTION-C

2x10=20

Answer any Two Questions from Section C.

- Q7.** Write short notes on any two of the following.
- (i) Babcock & Wilcox Boiler
 - (ii) Governing of steam Turbines.
 - (iii) Super saturated flow through Nozzles.
- Q8.** Determine the throat area, exit area and exit velocity for a steam nozzle to pass a mass flow of 0.2 kg/s when inlet conditions are 10 bar and 250°C and the final pressure is 2 bar.
Assume expansion is isentropic and that inlet velocity is negligible. Take the law $pv^{1.3} = \text{constant}$. Do not use h-s chart for calculation.
- Q9.** A single row impulse turbine develops 132.4 kW at a blade speed of 175 m/s, using 2 kg of steam per second. Steam leaves nozzle at 400 m/s. Velocity coefficient of the blades is 0.9. Steam leaves the turbine blade usually. Determine the nozzle angle, blade angles at entry and exit assuming no shock.

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