J.C.Bose University of Science and Technology, YMCA, Faridabad

Dec 2018

B.Tech IV SEMESTER

Applied Thermodynamics (MU-206) (Reappear)

Time: 3 Hours		Max. Marks:60

Instructions:
1. It is compulsory to answer all the questions (2 marks each) of Part -A in short.
2. Answer any four questions from Part -B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.
4. Use of steam tables and the mollier diagram is allowed.

PART –A

Q1 (a) Name any three gaseous fuels. Also give the advantages and disadvantages of gaseous fuels over the other types of fuels. (2)

(b) Define for fuel combustion: (a) stochiometric A/F ratio, (b) excess air. (2)

(c) What do you mean by draught? How is it classified? (2)

(d) Draw p-V, T-S and h-S diagrams for rankine cycle with superheated steam at turbine inlet. Further give equations for the net workdone and the thermal efficiency for such a cycle. (2)

(e) What is a binary vapour cycle? (2)

(f) Define stage efficiency, overall efficiency and reheat factor in case of a steam turbine. (2)

(g) What is meant by supersaturated flow through a steam nozzle? What are its effects? (2)

(h) What are the sources of air leakage into a steam condenser? How does it affect the performance of the condenser plant? (2)

(i) Compare impulse and reaction steam turbines. (2)

(j) Compare reciprocating and rotary air compressors. (2)

PART –B

Q2 (a) With a neat sketch explain the construction and working of a Benson boiler. (5)

(b) What is the significance of the draught in a boiler? Deduce a relationship between draught pressure 'h' and the height of chimney 'H' for maximum discharge. (5)

Q3 A 35 kW turbine consumes 284 kg of steam per hour at 17.5 bar and 250⁰ C. If the condenser pressure is 0.14 bar, determine the final condition of steam and the rankine efficiency of the plant. (10)

Q4 Derive an expression for discharge through convergent-divergent nozzle. Further proceed to find the maximum discharge and hence define the critical pressure ratio. (10)

Q5   What do you mean by compounding of steam turbines? Why is done? Discuss different types of compounding.   (10)

Q6 (a) With a neat sketch explain the elements of a condensing plant.   (5)
   (b) With a neat sketch explain the working of a low level parallel flow jet condenser.   (5)

Q7   Sketch the theoretical indicator diagram for a single stage, single cylinder reciprocating compressor with clearance volume showing the various processes. For such a compressor, derive the expression for workdone in terms of mass rate of flow of air, initial temperature, pressure ratio and index of compression.   (10)

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