

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) stoichiometric 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 250°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)
